TITLE: BULK STORAGE BUILDING

CONTENTS

INVITATION TO BID

ANACONDA ALUMINUM COMPANY

BULK STORAGE BUILDING

Sealed bids for the construction of a bulk storage building will be received by Anaconda Aluminum Company, Columbia Falls, Montana. Site of the improvements is at the plant site, approximately one half mile northeast of Columbia Falls, Montana.

Bids will be opened at 2:00 o'clock P.M. MDST, the 12th

day of October 1981, at the Purchasing Offices of Anaconda Aluminum Company, Columbia Falls, Montana.

The Company reserves the right to ascertain the financial stability and general reputation of the bidder. The right is reserved by the Company to put aside any bidder's proposal who they judge is not financially or otherwise competent to be awarded a construction contract.

Attention is invited to the Plans and Specifications in which contain instructions that are to be followed in all respects. All proposals shall be submitted on the form provided in the Specifications. The proposal forms shall not be removed from the bound copy of Specifications and Contrqct Documents.

Anaconda Aluminum Company reserves the right to reject any or all bids or to accept any bid or combination of bids which it feels is in the best interest of the Company.

Dated at Columbia Falls, Montana this 5th day of October 1981.

Anaconda Aluminum Company
P.O. Box 10
Columbia Falls, Montana 59912

Purchasing Offices

PROPOSAL

ANACONDA ALUMINUM COMPANY

BULK STORAGE BUILDING

Date: _____

TO: Anaconda Aluminum Company
Purchasing Offices
P.O. Box 10
Columbia Falls, Montana 59912

Gentlemen:

The Bidder, in compliance with your invitation for bids and having examined Plans and Specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed project, including the availability of supplies proposes to construct the project in accordance with the contract documents and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the contract documents, of which this proposal is a part.

The Bidder hereby agrees to commence work under this contract on or before the date specified in the Notice to Proceed issued by the Owner.

Bidder agrees to perform all work shown on the Plans and described in the Specifications for the prices shown, in writing, on the following Bid Sheet.

In submitting this bid it is understood that the right is reserved by the Owner to reject any and all bids, or to accept any combination of bids that would be to the best interest of the Owner and it is agreed that this bid may not be withdrawn during a period of 30 days after the scheduled time for the receipt of bids.

Bidder acknowledges receipt of the following addendum:

_____ _____

_____ _____

Date _____ 1981, at Kalispell, Montana.

By _____ _____
Contractor Montana Contractor's License

_____
Title

BID SHEET

Anaconda Aluminum Company

Bulk Storage Building

Bid Opening Date: October 12, 1981
2:00 o'Clock P.M.

_____ hereby proposes to effect
Contractor
the complete construction of Anaconda Aluminum's bulk storage building for the lump sum of _____

_____
written in words

Total Bid $_____

Signed_____
Bidder Authorized Signature

CONTRACT TERMS AND CONDITIONS

ANACONDA ALUMINUM COMPANY

DIVISION OF THE ANACONDA COMPANY

CONTRACT TERMS AND CONDITIONS

ARTICLE I. SITE AND OTHER EXAMINATIONS - OBSERVANCE OF LAWS

A. The Contractor represents that, if required by the law of State wherein the work is to be performed, he procures a license to do business and complies with all other necessary requirements before submitting his bid hereunder.

B. The Contractor represents that he has had opportunity and has carefully examined all drawings, specifications and Governmental restrictions, permits, and license requirements, and all other laws and rules applicable to the work to be done under this contract, the site of the work, its surroundings and the local conditions, and has made all investigations essential to a full understanding of the difficulties which may be encountered, and has special qualifications for doing the work covered by this contract in accordance with such drawings and specifications and the terms of this contract.

C. The Contractor shall promptly and before commencing work procure, at his own expense, all necessary permits and licenses (including licenses to do business), and will, in the performance of the work, observe and abide by all applicable laws, regulations, ordinances, Governmental restrictions and other rules.

D. The Contractor agrees to hold the Owner harmless from any liability or penalty which might be imposed by reason of an asserted violation by the Contractor of any such laws, regulations, ordinances Governmental restrictions or other rules.

ARTICLE 2. SPECIFICATIONS AND DRAWINGS

A. The Contractor shall at all times keep at the site of the work a copy of the drawings and specifications of this contract. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In any case of discrepancy in the figures, drawings, or specifications, the matter shall be immediately submitted to the representative designated by Owner, without whose decision said discrepancey shall not be adjusted by the Contractor, save only at his own risk and expense. Owner will furnish, from time to time, such detailed drawings and other information as it may consider necessary.

B. The Contractor and his subcontractors shall furnish all shop drawings, properly identified, required by the specifications. All shop drawings submitted by subcontractors shall be first checked by the Contractor and corrected before being submitted to Owner. Approval of shop drawings by Owner shall not relieve the Contractor from responsibility for errors or omissions therein, and the Contractor, notwithstanding such approval, shall correct all errors and omissions.

C. All drawings, specifications, and copies thereof furnished by or on behalf of Owner are the property of Owner and shall be returned upon request or at the completion of the work whichever occurs first. The drawings, specifications, and all copies thereof are given to the Contractor for the limited purpose of use by him, his subcontractors and material suppliers in connection with the Contractor's performance under this contract; and they may not be used for any other purpose whatsoever without the prior written consent of Owner. The information contained on the drawings and in the specifications is confidential and, except for the purpose specified above, neither the drawings, specifications, nor any part thereof, nor any information concerning them may be copied, exhibited or furnished to others without the prior written consent of Owner, and no photographs may be taken of any article fabricated or assembled from the drawings and/or specifications without the prior written consent of Owner.

D. The originals of all drawings, or mylar reproductions thereof in the case of standard detail drawings, furnished by the Contractor as part of the work are the property of Owner and shall be delivered to Owner complete with all field revisions before final payment is made.

ARTICLE 3. CHANGES

Owner may, at any time, by a written change order, or by the issuance of an Extra Work Ticket, make changes in the drawings or specifications of this contract, omit certain work or require additional work to be performed by the Contractor. If such changes shall materially affect the amount of work or the time required for its performance, or shall increase or decrease the cost of the work to the Contractor, an equitable adjustment in the contract price or time for performance, or both, shall be made; provided, however, that the Contractor shall proceed with the prosecution of the work so changed without waiting for an agreement to be reached concerning such adjustment.

Any change in the contract price necessitated by such changes shall be made by whichever of the following methods shall then be acceptable to owner.

A. by adding or deducting a lump sum;

B. by adding or deducting a unit price;

C. by adding:

1. an amount equal to the actual cost of all field labor (thus excluding costs of administration, clerical expenses, timekeeping, and superintendence) required to perform such additional work, as measured by the application of straight time labor rates, plus

2. an amount equal to the actual cost of the premium portion of overtime labor when such overtime work is authorized by Owner for the performance of additional work, plus

3. an amount equal to the Contractor's actual cost of additional insurance and taxes measured by payroll, travel pay, and contributions measured by wages which shall include fees and assessments incurred in the performance of such additional work, plus

4. an amount for the actual cost of material furnished and expendable tools and supplies directly consumed in completion of such additional work by the Contractor, the Contractor being required to take all available discounts, plus

5. an amount to cover the use of equipment (other than small tools) required to perform such additional work at rental rates previously agreed upon, plus

6. an amount for profit and overhead equal to 10 % of Items 1, 3, and 4 of this Article.

7. If the Contractor procures the performance of such additional work by other than its own employees, the Contractor shall be entitled to an amount for profit and overhead equal to 10 % of the total cost invoiced by the Subcontractor, subject to prior approval by Owner.

The Contractor shall keep full and detailed accounts and records as may be necessary to reflect its costs for work performed under this Article 3C, and these records shall be subject to audit by Owner.

Any claim for adjustment under this Article must be asserted within ten (10) days from the date the change was ordered, provided that Owner, without thereby waiving this provision, may consider any such claim prior to completion and acceptance of the work. If any extra, additional or different work be executed by the Contractor without previous written order given by Owner, no charge will be allowed.

ARTICLE 4. SUPERINTENDENCE BY THE CONTRACTOR

The Contractor shall give his personal superintendence to the work or have a competent foreman or superintendent satisfactory to Owner, at the site of the work at all times during progress of the work with authority to act for the Contractor.

ARTICLE 5. MATERIALS AND WORKMANSHIP

Unless otherwise specifically provided for in this contract, all workmanship, equipment, materials and articles incorporated in the work covered by this contract are to be of the best grade of their respective kind for the purpose. When any equipment, material, or article is proposed by the Contractor as conforming to or as an equal to any particular standard for like items referred to in this Contract, Owner shall decide the question of equality. The Contractor shall furnish to Owner for its approval the name of the manufacturer of machinery and mechanical and other equipment which he contemplates incorporating in the work, together with performance capacities thereof and other pertinent information. When required by this contract, or when called for by Owner, the Contractor shall furnish Owner, for approval, full information concerning the materials or articles which he contemplates incorporating in the work. Samples of materials shall be submitted for approval when so requested. Machinery, equipment, materials and articles installed or used without such approval shall be at the risk of subsequent rejection.

ARTICLE 6. INSPECTION AND TESTS

A. The Owner and its representatives shall at all times have access to the work wherever it is in preparation or in progress, and the Contractor shall provide proper facilities for such access and for inspection.

B. Owner shall have the right to reject defective materials or workmanship and to require their correction. Rejected workmanship shall be satisfactorily corrected, and rejected materials shall be immediately removed from the premises, without charge. If the Contractor does not correct such defective work within a reasonable time or remove rejected materials immediately, Owner may correct such defective work, or remove such rejected materials and charge the expense to the Contractor. Should Owner at any time before final acceptance of the entire work desire to make an examination of the work already completed by removing or tearing out same, the Contractor shall, upon request, promptly furnish all necessary facilities, labor and materials therefor. If such work is found to be defective in any material respect due to fault of the Contractor or his subcontractors, the Contractor shall defray all the expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of this contract, the Contractor will be reimbursed by Owner for the work necessarily involved in the examination and replacement, in accordance with Article 3, Section 3, of these General Conditions.

C. When any work is being executed away from the premises, Owner shall be notified in writing in reasonable time where such work is to be done and when it shall be ready for inspection, so that the Owner may inspect the same from time to time before delivery.

D. The failure of Owner during the progress of the work to discover or reject material or work not in accordance with the contract, shall not be deemed an acceptance thereof or a waiver of defects therein and neither payment nor partial or entire occupancey of the premises by the Owner shall be construed to be an acceptance of work or materials which are not strictly in accordance with this contract.

E. All laboratory tests required by Owner shall be made in a laboratory approved by Owner, and Owner will, unless otherwise provided in this contract, pay all costs of such tests and engineering services. Unless otherwise specified by Owner, all tests shall be made in accordance with the current standard methods of the American Society for Testing Materials governing the materials tests.

ARTICLE 7. GUARANTEE

A. In addition to the specific guarantees required by the specifications for the work to be performed under this contract, the Contractor guarantees all work to be performed and all materials to be furnished under this contract against defects in materials or workmanship for a period of one (1) year from the date of final written acceptance of the completed work by Owner. The Contractor shall, within a reasonable time after receipt of written notice thereof, repair or replace defective materials or workmanship which may develop before the expiration of said one-year period and shall repair or replace other work which shall have been damaged by such defects or the repairing of the same, all at his own expense and without cost to Owner.

B. Where the Contractor, under this contract, is to furnish, or is responsible for, the design of any machinery or equipment or of a process, the Contractor guarantees that the same shall meet the performance requirements specified therefor in this contract. The inspection, testing, approval and or acceptance by Owner of any such machinery, equipment, process or work shall not, unless specifically agreed to by Owner, relieve the Contractor of its obligations under this Section B with respect thereto. The guarantees contained in this Section B are in addition to those guarantees contained in Section A above and Owner, in the event of a breach by the Contractor of its obligations under this Section B, shall not be limited to the remedies set forth in Section A but shall have all the rights and remedies permitted by this contract and by law.

ARTICLE 8. DELAYS AND EXTENSIONS OF TIME

The Contractor shall not be entitled to any damages or compensation for delays in the commencement, progress or completion of the work caused by any act, default, or neglect of Owner or other contractor performing a contract with Owner, or by fire, flood, act of God, strike, or any other cause whatsoever. A timely written request for an extension of time shall be the Contractor's sole and exclusive remedy for such delays.

If any such delay is not caused by or contributed to by any act, default or neglect of the Contractor and is attributable to causes beyond his control, the time for completion shall be extended by Owner for a period of time determined by Owner to be equivalent to the time of such delay; but no extension of time will be granted unless Owner receives the Contractor's written request therefor within 48 hours after the delay commences.

ARTICLE 9. MATERIALS FURNISHED

No materials, supplies, equipment, labor, services or any other things required for the performance of the work hereunder are to be furnished by Owner unless this conttact otherwise expressly provides. In case this contract expressly provides that any materials, supplies, equipment, labor, services or any other things will be furnished by the Owner, Owner will use reasonable efforts to furnish or cause the same to be furnished when required by the Contractor but Owner shall not be liable for any delay in furnishing the same.

ARTICLE 10. TITLE AND RISK OF LOSS

Title to all completed or partially completed work at the Owner's jobsite, and to all materials delivered to and stored at said jobsite which are intended to become a part of the completed work covered by this contract, shall be in the Owner. Notwithstanding the foregoing, and prior to acceptance of the completed work by Owner, the Contractor shall be liable for all loss of or damage to said completed work, partially completed work, materials furnished by the Contractor, and materials fur-

nished by others, the custody of which has been given to the Contractor, arising from any cause other than a cause against which the Owner has undertaken to carry insurance. In the event of loss or damage from causes other than those against which the Owner has undertaken to carry insurance, the Contractor shall replace or repair the said work or materials at his own cost and expense , to the complete satisfaction of Owner.

ARTICLE 11. OTHER WORK

A. It is understood that work not covered by this contract may be performed by Owner or others in the same area that must be occupied by the Contractor. In such event the Contractor shall fully cooperate with Owner and such others in scheduling his work so that a minimum of interference will occur. It is also understood that the Owner may occupy the premises during performance of work by the Contractor hereunder and that such occupancy shall not constitute acceptance of the work.

B. The Contractor shall check all lines, grades and elevations previously established before proceeding with his own work and make certain they are suitable for receiving his work under this contract. If any fault exists, the Contractor shall notify Owner in writing and shall not proceed until all faults are corrected. If the Contractor shall proceed without such notification in writing or such correction, such action shall be conclusively deemed an admission by him that such lines, grades and elevations are suitable for receiving his work, and, if it is then found necessary to correct any faults or to reconstruct any part of the Contractor's work because of such faults, the Contractor shall correct or reconstruct the same without expense to Owner.

C. The Contractor shall familiarize himself with the specifications and drawings of work to be done by others but related to that part of the work in which he is participating. Before proceeding with his own work and from time to time as his work progresses, the Contractor shall examine the work installed by others, insofar as it influences his work, and shall promptly notify the Construction Manager in writing if any condition exists that will prevent his giving satisfactory results in his own work. Should the Contractor start or continue his work without such notification, such action shall be conclusively deemed an admission by him of the suitability of all such other work, and, if it is then found necessary to correct such other work or to reconstruct the Contractor's work because of conditions in such other work, the Contractor shall correct or reconstruct the same without expense to Owner.

ARTICLE 12. SUBCONTRACTS

The Contractor shall procure Owner's written permission before subletting or subcontracting any portion of the work. All subcontracts and all orders for the purchase or rental of supplies, material, or equipment, shall provide that the subcontractor, supplier, or materialman shall be bound by and subject to all the terms and conditions of this contract. No subcontract or order shall relieve the Contractor from his obligations hereunder or shall purport to bind Owner, but each subcontract or order shall contain a provision permitting assignment to Owner.

ARTICLE 13. LIENS

A. The Contractor agrees that he will not make, file, or maintain a medhanic's or other lien or claim of any kind or character whatsoever against any building or other structure to which this contract relates, the additions, improvements, alterations, or repairs made thereon, the ground on which said building or other structure is situated, or any other property or property interest owned, held, occupied or otherwise possessed by Owner, for or on account of any labor, materials, fixtures, tools, machinery, equipment or any other things furnished, or any othe r work done or performance given under, arising out of, or in any manner connected with this contract, or any agreement supplemental thereto, and the Contractor hereby expressly waives and relinquishes any and all rights which he now has, or may hereafter acquire, to file or maintain any mechanic's or other lien or claim of any kind or character whatsoever against the aforesaid property or property interests; and the Contractor further agrees that this provision waiving the right of liens shall be an independent covenant.

B. The Contractor, on behalf of his subcontractors,materialmen, and all other persons entitled to a mechanic's or other lien or claim of any kind or character whatsoever, agrees that no such lien or claim shall be made, filed, or maintained against said building or other structure, the additions, improvements, alterations, or repairs made thereon, the ground on which said building or structure is situated, or any othe r property or property interest owned, held, occupied or otherwise possessed by Owner, by any subcontractors, materialmen, or any other persons entitled to such a lien or claim for or on account of any labor, materials, fixtures, tools, machinery, equipment or any other things furnished, or any other work done or performance given under, arising out of, or in any manner connected with this contract, any agreement supplemental thereto, or any subcontract made pursuant to or in connection with the performance under this contract or any agreement supplemental thereto. The Contractor, on behalf of his subcontractors, materialmen, and all other persons entitled to such a lien or claim, does hereby expressly waive and relinquid any and all rights which any of the said persons now have, or may hereafter acquire, to file or maintain any such lien or claim against the aforesaid property and property interests; and the Contractor, on behalf of the said persons, further agrees that this provision waiving the right of liens shall be an independent covenant.

C. The Contractor further covenants and agrees that he will not at any time suffer or permit any such lien or claim to be made, filed, or maintained by any person or persons and that he will inform in writing any and all subcontractors, materialmen, and other persons entitled to such a lien or claim of these provisions and agree that, in all contracts made with the said persons hereunder, the Contractor will include a provision that the said persons shall not make, file, or maintain such a lien or claim and that the said persons shall waive any and all rights they may have, or thereafter acquire, to make, file or maintain any such lien or claim.

D. The Contractor shall save and hold Owner harmless from and against any and all liens or claims of any kind or character whatsoever that may be filed against the aforesaid property or property interests by a subcontractor, materialman, or any other person arising out of or in

any manner connected with the performance of this contract, any agreement supplemental hereto, or any subcontract made pursuant to or in connection with the performance of this contract or any agreement supplemental thereto; and the Contractor shall, at his own expense, defend any and all actions based upon such liens or claims and shall pay all charges of attorneys and all costs and other expenses arising therefrom.

ARTICLE 14. PAYMENTS

A. Partial payments will be made by Owner upon proper application by the Contractor during the progress of the work as follows:

1. On or about the first day of each month, the Contractor shall render one invoice, in triplicate, for work completed (including "Lump Sum" and "Unit Price" Extra Work Tickets) through the last work day of the previous month. (For purposes of this Section A of Article 14 only, the term "work completed" shall mean material or equipment actually installed in place pursuant to this contract; and there shall be mutual agreement between designated representatives of Owner and Contractor before preparation of the invoice.) Separate invoices shall be rendered for each Extra Work Ticket issued under Article 3, Section C, upon completion of the extra work involved. The purchase order number shall be shown on all invoices.

2. Invoices for lump sum and unit price work shall be prepared as follows:

a. Indicate each "Item for Payment," the percentage completion thereof or units applicable thereto, and the gross amount due for that particular item.

b. Indicate the total aggregate amount for all items listed under (2.a.).

c. Subtract 10 % of the total aggregate amount (this is called retained percentage).

d. Subtract the net amount previously billed.

e. Indicate the difference which is the net amount due for that invoice.

3. The separate invoices for extra work completed under Article 3, Section C, will not be subject to retained percentage.

4. Each invoice shall be mailed by the Contractor to Owner's Engineering Manager. Invoice will be paid promptly after local approval by Owner.

B. Complete payment or payment of retained percentage, as the case may be, will be made by Owner upon proper application by the Contractor after delivery of the work, complete and undamaged, along with releases or receipts and an affidavit as provided in Paragraph C of this Article, and upon written acceptance thereof by Owner. The Contractor shall render one invoice, in triplicate, with the Purchase Order number shown thereon to Owner's Engineering Manager. Payment will be made promptly after Owner approval.

C. Neither the final payment nor any part of the retained percentage shall become due until the Contractor shall deliver to Owner executed full and complete releases of all liens arising out of this contract, any agreement supplemental thereto, or any subcontract made

pursuant to or in connection with the performance under this contract or any agreement supplemental thereto, or receipts in full in lieu thereof, and in either case an affidavit listing all persons who might otherwise be entitled to file, claim, or maintain alien of any kind or character whatsoever, and containing an averment that all of the said persons have been paid in full; but, if any of said persons refuses to furnish an actual release or receipt in full, the Contractor may furnish a bond satisfactory to Owner to indemnify against any claim or lien.

D. If, after all payments are made by Owner, any lien or claim remains unsatisfied, the Contractor shall reimburse Owner for all monies that Owner may be compelled to pay in discharging such a lien or claim, including all costs and attorneys' fees.

E. Payments otherwise due may be withheld by Owner on account of defective work not remedied, liens or other claims filed, reasonable evidence indicating probable filing of liens or other claims, failure of the Contractor to make payments properly to his subcontractors, or for material or labor, reasonable doubt that the contract can be completed for the balance then unpaid, the failure of the Contractor to perform any of his other obligations under this contract or to protect Owner against any liability arising out of the Contractor's failure to pay or discharge taxes or other obligations. If the causes for which payment is withheld are removed, the withheld payments will promptly be made. If the said causes are not removed on written notice, owner may rectify the same at the Contractor's expense.

F. Forthwith, upon request of Owner made at any time prior to acceptance of the work, the Contractor shall submit to Owner a schedule of prices covering the various divisions of the work to be done under this contract. Such schedule shall aggregate the total contract price and, when approved by Owner, shall be used as a basis for determining partial payments.

G. Acceptance by the Contractor of the final payment under this contract shall constitute a waiver, release and discharge of any and all claims and demands of any kind or character whatsoever which the Contractor then has, or may or can thereafter acquire, against owner, and its successors and assigns for or on account of any matter or thing whatsoever arising out of, or in any manner connected with the performance of this contract, or any agreement supplemental hereto. However, final payment by Owner shall not constitute a waiver, release or discharge of any claims or demands, which Owner then has, or may or can thereafter acquire against the Contractor, its successors and assigns, for or on account of any matter or thing whatsoever arising out of, or in any manner connected with, the performance of this contract, or any agreement supplemental hereto.

ARTICLE 15. LIABILITY

The Contractor shall save and hold Owner harmless from and against all liability, claims and demands on account of personal injuries (including death), or property loss or damage to others (including the Contractor and employees and invitees of Owner and of the Contractor) arising out of or in any manner connected with the performance of the contract, and caused by the negligent or willful act or omission to act of the Contractor, a subcontractor or materialman hereunder, or the

employees or invitees of any of them, and the Contractor shall at his own expense defend any and all actions based thereon and shall pay all charges of attorneys and all costs and other expenses arising therefrom.

ARTICLE 16. INSURANCE

A. Owner will maintain Builder's Risk Insurance on "all risk" basis insuring the equipment intended to become a part of the completed construction work while in transit to the jobsite, while awaiting and during erection, testing and until final acceptance of the entire project, title to which is in the Owner, but will not cover items of the Contractor's property which are used in or are incident to the construction of the work but do not become a part thereof. Owner will hold harmless Contractor from all losses covered by Builder's Risk Insurance with coverage on an "all risk" basis; including, but without limitation, all losses within the policy deductible.

B. The Contractor and each subcontractor shall, during the progress of the work, maintain: (1) Workmen's Compensation Insurance in accordance with the laws of the State in which the work is being done (2) Public Liability and Property Damage Insurance and (3) Automobile Liability and Property Damage Insurance. All coverage hereunder shall be provided with liability limits acceptable to Owner.

ARTICLE 17. PATENTS

The Contractor shall defend all suits or claims and shall hold and save Owner harmless from liability of any nature or kind including costs and expenses for or on account of infringement of any United States Letters Patent by reason of the nature, form or condition of any material, article or machine supplied by the Contractor in the performance of this contract or by reason of use or sale by Owner of any such material, article or machine for a purpose intended or reasonably foreseeable by the Contractor; provided that Owner shall not obtain any right under this Article as to any claim or suit concerning which it does not give to the Contractor prompt notice in writing upon learning thereof and full opportunity to defend and dispose of such claim or suit.

ARTICLE 18. TAXES

The Contractor shall pay all sales, use and other taxes of every kind applicable to the performance of this contract, unless otherwise specified in the contract, and shall reimburse Owner if it shall pay any such taxes.

ARTICLE 19. SOCIAL SECURITY PAYMENTS

The Contractor shall pay all taxes and contributions measured by wages, salaries or other remunerations of his employees and the employees of his subcontractors required by the Federal Social Security Act or the laws of the State in which the work is done, and shall be

exclusively liable for said taxes and contributions. The Contractor shall indemnify and hold harmless Owner on account of any taxes or contributions measured by the wages, salaries or other remunerations as aforesaid of employees of the Contractor and the subcontractors assessed against Owner under the authority of said Act or laws of said State.

ARTICLE 20. PROTECTION OF PROPERTY AND PERSONS

The Contractor shall properly protect the property of the Owner and adjacent property. He shall take all necessary precautions for the safety of the employees on the work and shall comply with all applicable provisions of Federal, State and municipal safety laws and building codes to prevent accidents or injuries to persons on or about or adjacent to the premises where the work is being performed. The Contractor shall also comply promptly with any instructions of Owner for the prevention of accidents or fires or for the elimination of accident or fire hazards or unsafe practices.

ARTICLE 21. EXCLUSION OF CERTAIN PERSONS

Except with the prior written consent of Owner, the Contractor shall not permit to enter upon the premises of the Owner at the site of the work any persons other than officers, employees or representatives of Owner, the Contractor or his subcontractors. The Contractor shall not knowingly employ upon the premises of the Owner, without the consent of Owner, any person who is a member of or associated with any organization designated by the Attorney General as having interests in conflict with those of the United States; or any person whose character is such that his presence on the Owner's premises might obviously be detrimental to Owner's interest. Owner shall have the right to bar or remove from the premises any such individual after appropriate notice has been given to the Contractor.

ARTICLE 22. CLEANING

The Contractor shall at all times keep the Owner's premises and the adjoining premises, driveways and streets clean of rubbish caused by the Contractor's operations, and at the completion of the work shall remove all rubbish from and about the premises and all of this tools, equipment, temporary work and surplus materials and shall have the work clean and ready for use. If the Contractor does not attend to such cleaning immediately upon request, Owner may cause such cleaning to be done by others and charge the cost (including, but not limited to, an applicable amount of Owner's overhead) of the same to the Contractor.

ARTICLE 23. INDEPENDENT CONTRACTOR

The Contractor hereunder shall be an independent contractor, and Owner shall have no right to exercise supervision as to the manner or

method of doing work.

ARTICLE 24. TERMINATION OF CONTRACT BY OWNER

A. Should the Contractor at any time refuse or fail to prosecute the work with promptness and diligence or to perform any of his other obligations under this contract, Owner may terminate the Contractor's right to proceed with the work by written notice to the Contractor. In such event, Owner may enter upon the premises and finish the work by whatever method it may deem expedient, including the hiring of another Contractor or other Contractors and, for that purpose, may take possession of all materials, machinery, equipment, tools and appliances thereon and exercise all rights, options and privileges of the Contractor. In such case the Contractor shall not be entitled to receive any further payment until the work is finished. If the unpaid balance of the contract price shall exceed the expense of finishing the work, including compensation for additional managerial and administrative services, such excess will be paid to the Contractor. If such expense shall exceed such unpaid balance, the Contractor shall be liable for andshall pay the difference to Owner.

B. Owner may, for its own convenience, terminate the Contractor's right to proceed with some or all of the work by written notice to the Contractor. Such termination shall be effective in the manner specified in such notice and shall be without prejudice to any claims which Owner may have against the Contractor, and shall not affect the obligations and duties of the Contractor hereunder with respect to work not terminated.

C. On receipt of notice under Paragraph B of this Article, the Contractor shall, with respect to the work terminated, unless the notice states otherwise, immediately discontinue such work and the placing of orders for materials, facilities and supplies in connection with the performance thereof; if requested, make every reasonable effort to procure cancellation of all existing orders or contracts upon terms satisfactory to Owner; and thereafter do only such work as may be necessary to preserve and protect the work already in progress and to protect material, plant and equipment at the site of the work or in transit thereto.

D. Upon termination pursuant to Paragrpah B of this Article, the Contractor shall be paid a pro rata portion of the compensation provided herein for the portion of the terminated work already performed, including therein material and services for which he has made firm contracts which are not cancelled, it being understood that Owner shall be entitled to such material and services. Upon determination of the amount of said pro rata compensation, Owner will promptly pay such amount to the Contractor upon delivery by him of the releases or receipts and affidavit, pursuant to Paragraph C of Article 14 hereof.

ARTICLE 25. ASSIGNMENT

This contract shall be binding upon, and inure to the benefit of, the successors and assigns of the parties, except that the Contractor shall not assign any right or obligation under this contract, including

the right to receive monies due or to become due under this contract without Owner's prior written consent. No assignment shall relieve the Contractor of any obligation hereunder.

ARTICLE 26. EXECUTIVE ORDER NO. 11246 - EQUAL EMPLOYMENT OPPORTUNITY

A. For contracts exceeding $10,000 unless exempt, Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employemnt, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employement, notices to be provided by the government contracting officer setting forth the provisions of this nondiscrimination clause.

2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employement without regard to race, color, religion, sex or national origin.

3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union of workers representative of the Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

4. The Contractor will comply with all provision of Executive Order 11246 of September 24, 1965 and of the rules, regulations, and relevant orders of the Secretary of Labor.

5. The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965 and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.

6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders this contract may be cancelled terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965 and such other sanctions may be imposed and

remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation or order of the Secretary of Labor on Equal Employment Opportunity, or as otherwise provided by law.

7. The Contractor will include the provisions of paragraphs (1) through (7) in every subcontract or contract unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or contract as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

8. CERTIFICATION OF NONSEGREGATED FACILITIES

(Applicable to contracts, subcontracts, and to agreements with applicants who are themselves performing Federally assisted construction contracts, exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause). By the submission of this bid, the bidder, offeror, applicant, or subcontractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated failities are maintained. He certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The bidder, offeror, applicant, or subcontractor agrees that a breach of this certification is a violation of the Equal Opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion or national origin, because of habit, local custom or otherwise. He further agrees that (except where he has obtained identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of Equal Opportunity clause; that he will retain such certifications in his files, and that he will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods).

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES. A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

(NOTE: THE PENALTY FOR MAKING FALSE STATEMENT IN OFFERS IS PRESCRIBED IN 18 U.S.C. 1001.)

B. For contracts exceeding $50,000 unless exempt, Contractor agrees as follows:

1. The Contractor agrees to file with the appropriate federal agency a complete and accurate report on Standard Form 100 (EEO-1) within 30 days after the signing of this agreement or the award of any such contract, as the case may be (unless such a report has been filed in the last 12 months), and agrees to continue to file such reports annually, on or before March 31st.

2. The Contractor agrees to develop and maintain a current written affirmative action compliance program for each of its establishments in accordance with the regulations of the Secretary of Labor promulgated under Executive Order 11246, as amended.

ARTICLE 27. COMPLIANCE OF TERMS AND CONDITIONS

Owner's failure at any time, or from time to time, to enforce or require the strict keeping and performance by Contractor of any of the terms and conditions of the contract shall not constitute a waiver by Owner of such terms or conditions, and shall not affect or impair such terms or conditions in any way, or Owner's right at any time to avail itself of such remedies as it may have for any breach or breaches of such terms or conditions. No waiver of any breach of the terms and conditions of the contract shall be held to be a waiver of any other or subsequent breach.

ARTICLE 28. NOTICES

Any notice, order, certificate or writing provided for in this contract shall be considered as having been given to Owner, if delivered personally to the Engineering Manager, and to the Contractor, if delivered personally to his field representative at the site of the work. In addition, a copy of any such notice, order, certificate or writing shall be mailed by certified mail, postage prepaid, in case of Owner, to its Vice President and Chief Counsel, P.O. Box 32860, Louisville, Kentucky 40232 and in the case of the Contractor, to him at the address supplied by him to Owner.

ARTICLE 29. RECORDS TO BE KEPT AND OWNER'S AUDIT RIGHTS ON COST PLUS CONTRACTS

The Contractor shall keep full and detailed accounts and records to reflect its costs for all work performed on a cost plus basis and these records shall be subject to audit by Owner.

IN WITNESS WHEREOF, the parties hereto have caused this CONTRACT to be executed by their duly authorized representatives, effective as of the date first herein above written

	THE ANACONDA COMPANY
BY Richard W Slama	BY R V Sneddon
TITLE Pres.	TITLE Plant Manager
ATTEST Gary Slama	ATTEST S W Eccleston
SEAL ______	SEAL ______

EXHIBIT A

EXHIBIT A

PURCHASE ORDER #31 60315 R

In Acceptance of this Purchase Order, the following attachments become a part of the same:

1. Insurance Requirements
2. Confidentiality Agreement
3. Hold Harmless Agreement - Medical Dispensary
4. Hold Harmless Agreement - Emergency Transportation
5. Safety Agreement
6. Federal & State Laws & Indemnification Agreement
7. Equal Employment Opportunity Clause Agreement

Further acceptance of this Purchase Order is contingent upon return of Purchase Order acknowledgement (blue copy) along with signed copies of the above enumerated attachments.

A Certificate of Insurance is to be returned to the Purchasing Department prior to commencement of work.

BUYER: Anaconda Aluminum Company

BY: James A. Bowe

Authorized Signature

INSURANCE REQUIREMENTS

PURCHASE ORDER NO. 31 60315 R

ADDITIONAL TERMS AND CONDITIONS

(To be included in each purchase order where Seller is required to perform services at Buyer's plant site)

Seller from the time of commencement of the work hereunder until completion of the work and removal of all remaining materials, supplies, and personnel from the premises shall provide and maintain in effect the following types and amounts of insurance with insurance companies satisfactory to Buyer:

Contracts under $50,000 and Non-Hazardous Service Contracts

Employers' Liability

$100,000 per person, $100,000 per accident

Comprehensive General Liability Insurance

Bodily Injury Liability - $300,000 each occurrence

Property Damage Liability - $100,000 each occurrence

Comprehensive Automobile Liability Insurance

Bodily Injury Liability - $100,000 each person, $300,000 each occurrence

Property Damage Liability - $100,000 each occurrence

Contracts over $50,000 but not exceeding $1,000,000 and all Contracts of a Hazardous Nature

Employers' Liability

$1,000,000 per person, $1,000,000 per accident

Comprehensive General Liability Insurance

Bodily Injury Liability - $500,000 each occurrence

Property Damage Liability - $1,000,000 each occurrence

Comprehensive Automobile Liability Insurance

Bodily Injury Liability - $250,000 each person, $500,000 each occurrence

Property Damage Liability - $1,000,000 each occurrence

Contracts over $1,000,000

Limits of liability will be individually determined for contracts exceeding $1,000,000, but in no event should they be less than:

Employers' Liability

$1,000,000 per person, $1,000,000 per accident

Comprehensive General Liability Insurance

Bodily Injury Liability - $1,000,000 each occurrence

Property Damage Liability - $1,000,000 each occurrence

Comprehensive Automobile Liability Insurance

Bodily Injury Liability - $1,000,000 each person, $1,000,000 each occurrence

Property Damage Liability - $1,000,000 each occurrence

Combined Single Limits of Liability

Many contractors will carry liability insurance with a combined single limit of liability for bodily injury liability and property damage liability, or both combined. In such event, the minimum acceptable limit should not be less than the sum of the amounts required for each accident for bodily injury and property damage.

All policies shall be endorsed to provide that underwriters and insurance companies of Seller shall not have any right of subrogation against Buyer or its affiliates. Subsidiaries, agents, employees, invitees, servants, sub-contractors, insurers, underwriters, and such other parties as Buyer may designate.

Seller shall furnish a Certificate of Insurance evidencing the insurance required hereunder and, upon request, shall furnish true copies of the actual policies. Each Certificate shall provide that 30-days prior written notice shall be given Buyer in the event of cancellation or material change in the policies. In order to avoid delays in commencing the work, Certificates and/or copies of the policies shall be addressed to the person or department requesting same, and are to be received by Anaconda prior to commencement of work. All policies shall be endorsed to provide that there will be no recourse against Buyer for payment of premium.

SELLER:

Sloma Associated, Inc.

By Richard W. Sloma
Authorized Signature

BUYER:

Anaconda Aluminum Company

By James A. Gowe
Authorized Signature

CONFIDENTIALITY AGREEMENT

THE ANACONDA COMPANY
ALUMINUM DIVISION

Gentlemen:

Re: Sumitomo Chemical Company, Limited ('Sumitomo") Vertical Stud Soderberg Reduction Cell Technology, and Aluminum Company of America ("Alcoa") Alcoa 398 Process Technology

I have been informed of the proprietory intrests of Sumitomo and Alcoa in the referenced Technical Information and Know-How agreements, and of Anaconda's obligations with respect thereto.

In consideration of the privilege given to me by Anaconda to visit the vicinity in which the referenced Technology is being employed, I agree to comply with Anaconda obligations of secrecy, confidentiality and non-disclosure and will:

(i) exercise all reasonable efforts to prevent third parties (other than as permitted herein) from gaining acvess to Technical Information which is subject to secrecy, confidentiality, and non-disclosure of these agreements,

(ii) inform all employees, contractors, agents, consultants and representatives to whom such Technical information may be disclosed or made available of the proprietory intrest of Alcoa and Sumitomo in such Technical Information and of the obligations of Anaconda with respect thereto and, when reasonably necessary to safegaurd such Technical Information, obtain appropriate secrecy agreements; and

(iii) not have such Technical Information in written, drawn or pictorial form without marking the same with the legend "Confidential"

All of the provisions of this agreement shall survive the expiration or termination of any other agreement with you and remain in full force and effect until December 31, 1986.

COMPANY NAME Slama Associated, Inc.
(Please Print)
ADDRESS 847 W. Center Street
SIGNATURE Richard W Slama DATE 11/17/81
WITNESS Mary Slama

Accepted:
The Anaconda Company
By James A. Power

HOLD HARMLESS AGREEMENT

MEDICAL DISPENSARY

WHEREAS, The Anaconda Company, Aluminum Division, has made available its medical dispensary and the services of its nurse or qualified attendant for the treatment of employees of Slama Associated, Inc., hereinafter called Contractor, who may be injured or become ill while employed by the Contractor on the premises of The Anaconda Company, Aluminum Division, Columbia Falls Reduction Plant:

NOW, THEREFORE, in consideration for the use of such facilities and for services to be rendered the Contractor hereby covenants and agrees:

1. That it will promptly pay to Anaconda, upon receipt of invoice, the sum of $10.00 for each of its employees who receives treatment for injury or illness by nurse attendant of The Anaconda Company, and the additional sum of $5.00 for each subsequent surgical redressing.

2. That it will promptly pay for all ambulance service rendered by an ambulance service company or hospital direct to the company or hospital rendering the service. Furthermore, that it will promptly pay for all physician fees direct to the attending physician.

3. That it will save harmless The Anaconda Company, its successors and assigns and all of their officers and employees against any and all claims or demands arising from services rendered to (or the use of said dispensary by) the Contractor, the Contractor's subcontractors, material men, or the employees or invitees of any of them, all as herein described.

SELLER:

Slama Associated, Inc.

BY: Richard W Slama
Authorized Signature

BUYER:

Anaconda Company, Aluminum Division

BY: James A. Bowe
Authorized Signature

AAC-1007

HOLD HARMLESS AGREEMENT

EMERGENCY TRANSPORTATION

THIS AGREEMENT, made this 21st day of October, 1981, between The Anaconda Company, Aluminum Division, hereinafter called Anaconda, and Slama Associated, Inc., hereinafter called Contractor,

WITNESSETH:

That whereas Contractor has undertaken to perform certain construction and installation work on premises of The Anaconda Company, Aluminum Division, Columbia Falls Reduction Plant, in Flathead County, Montana, involving employment of a considerable number of persons by Contract; and

Whereas there may be occasions when no public ambulance, public conveyance or vehicle owned by Contractor is immediately available for emergency transportation of an ill or injured employee to physician, hospital or Anaconda Medical Dispensary; and

Whereas Anaconda is willing to furnish such conveyance, if available, but only in case of emergency when Contractor cannot furnish or obtain such service elsewhere;

NOW, THEREFORE, the parties hereto have mutually convenanted and agreed as follows:

1. In case of such emergency some responsible employee of the Contractor shall notify the attendant in attendance that such emergency exists, the character of transportation that is desired and the fact that no other means of transportation is immediately available.

2. If the Anaconda ambulance is not then in use or if Anaconda has suitable passenger type automobile available it shall immediately put such vehicle and driver at the service of the Contractor for transportation of the ill or injured employee of the Contractor to either the Hospital, Doctor's offices or the Anaconda Medical Dispensary.

3. The driver furnished by Anaconda shall act solely as driver, subject to directions by Contractor as to route and whether the Kalispell Regional Hospital, North Valley Hospital, Clinics, Doctor's Offices or the Anaconda Medical Dispensary shall be the destination. Any ill or injured person shall be accompanied by at least one representative of Contractor who shall be solely responsible for the moving or assistance of the patient.

4. Contractor shall pay Anaconda for First Aid Conveyance service rendered from the Medical Dispensary to Columbia Falls, Kalispell, or Whitefish if required as follows:

   a. First Aid Conveyance to Columbia Falls at a rate of $30.00 per trip, to Kalispell at a rate of $64.00 per trip, and to Whitefish at a rate of $44.00 per trip and return in the event the patient is ready to return to plantsite within a fifteen minute period; otherwise, arrangements for patient's return must be made by the Contractor.

   b. No charge will be made for transportation between construction site and Anaconda Medical Dispensary.

5. Contractor shall save harmless The Anaconda Company, it's officers and employees against any and all claims or demands for injury to the property or person of the parties whomsoever where such claims or demands arise from or are incidental to the rendering of transportation services by Anaconda to the Contractor, the Contractor's subcontractors, material men, or the employees or invitees of any of them as above described.

IN WITNESS WHEREOF the parties hereto have caused this agreement to be executed as of the day and year first above written.

SELLER: Slama Associated, Inc

BY: Richard W. Slama
Authorized Signature

BUYER: The Anaconda Company, Aluminum Division

BY: James A. Gove
Authorized Signature

AAC-1006

SAFETY AGREEMENT

Anaconda Company, Aluminum Division
Columbia Falls Reduction Plant

This is to certify that I have received a copy of the Safety Procedures Manual which I have read and shall observe while working for Anaconda Company, Aluminum Division, Columbia Falls Reduction Plant.

SELLER:

Slama Associated, Inc

BY: Richard W Slama
Authorized Signature

BUYER:

Anaconda Company, Aluminum Division

BY: James A. Rowe
Authorized Signature

AAC-1008

FEDERAL AND STATE LAWS AND INDEMNIFICATION AGREEMENT

APPLICABLE FEDERAL & STATE LAWS:

If the contract is for construction work or services on the plantsite, the contractor must agree that he will:

1. Comply with all Federal and State Social Security and Unemployment insurance laws.

INDEMNIFICATION

If material, equipment, supplies and/or subcontractors are required by the contractor in the performance of his contract with Anaconda, he shall guarantee, by his signature to indemnify and hold harmless Anaconda against any and all injuries, including death, to his employees, any and all material and mechanics liens in his behalf or on the behalf of any of his suppliers and/or subcontractors.

SELLER:

Slama Associated, Inc.

By Richard W. Slama
Authorized Signature

BUYER:

Anaconda Industries, Aluminum Division

By James A. Rowe
Authorized Signature

CERTIFICATION OF NONSEGREGATED FACILITIES AND EQUAL EMPLOYMENT OPPORTUNITY CLAUSE AGREEMENT

I. CERTIFICATION OF NONSEGREGATED FACILITIES

The undersigned supplier certifies that it does not and will not maintain or provide for his employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity Clause required by Executive Order 11246 dated September 24, 1965. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, transportation, and housing facilities provided for employees which are segregated by explicit directive or are, in fact, segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. The undersigned further agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) it will obtain identical certifications from the proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that it will retain such certifications in its files and that it will forward the following notice to such proposed subcontractors (except where the proposed subcontractors have submitted identical certifications for specific time periods):

NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT FOR CERTIFICATIONS OF NONSEGREGATED FACILITIES

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e. quarterly, semiannually, or annually).
This certification shall be valid for the period January 1, through December 31,

II. EQUAL EMPLOYMENT OPPORTUNITY CLAUSE AGREEMENT

It is hereby agreed that the following provisions, which are also set forth in Section 202 of Executive Order 11246, as amended, are made a part of each agreement and purchase order presently existing or which may be entered into hereafter, between the undersigned supplier (contractor) and The Anaconda Company, ALUMINUM DIVISION and contractor agrees to comply with such provisions during the performance of any such agreement or purchase order. This Agreement shall be valid for the period January 1, through December 31,

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the provisions of paragraph (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of

enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

EXEMPTION CLAUSE

Our contract with The Anaconda Company, ALUMINUM DIVISION is exempt from the Equal Employment Clause pursuant to regulations issued under Federal Executive Order 11246.

Slama Associated, Inc.
(Company Name)

By Richard W. Slama
(Signature)

Pres.
(Title)

Date: 11/17/81

(Signature)

(Title)

(Date)

EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCE AGREEMENT

The undersigned hereby agrees, that if at any time it has 50 or more employees, and a supply or service contract or purchase order with The Anaconda Company, ALUMINUM DIVISION amounting to $50,000.00 or more, it will:

(a) During any such year file complete and accurate reports on standard Form 100 (EEO-1) (or such substitute form as may be designated) as required by Title 41, Chapter 60-1.7 Code of Federal Regulations.

(b) Develop a written affirmative action compliance program for each of its establishments, all as required by Title 41, Chapter 60-1.40 Code of Federal Regulations.

EXEMPTION CLAUSE

Our contract with The Anaconda Company, ALUMINUM DIVISION is exempt from the Equal Employment Opportunity Compliance Agreement.

Slama Associated, Inc.
(Company Name)

By Richard W. Slama
(Signature)

Pres.
(Title)

Date: 11/17/81

(Signature)

(Title)

(Date)

AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS

(a) The contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(b) The contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(c) In the event of the contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(d) The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

(e) The contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the contractor is bound by the terms of section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

(f) The contractor will include the provisions of this clause in every subcontract or purchase order of $2,500 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

EXEMPTION CLAUSE

Our contract with The Anaconda Company, ALUMINUM DIVISION is exempt from the Affirmative Action for Handicapped Workers required under Section 503 of the Rehabilitation Act of 1973.

Slama Associated, Inc.
(Company Name)

By Richard W Slama
(Signature)

Pres.
(Title)

Date: 11/17/81

(Signature)

(Title)

(Date)

AFFIRMATIVE ACTION FOR DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA

(a) The contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam Era in regard to any position for which the employee or applicant for employment is qualified. The contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans status in all employment practices such as the following: employment upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(b) The contractor agrees that all suitable employment openings of the contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required.

State and local government agencies holding Federal contracts of $10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in paragraphs (d) and (e).

(c) Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and nonveterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the contractor from any requirements in Executive Orders or regulations regarding nondiscrimination in employment.

(d) The reports required by paragraph (b) of this clause shall include, but not be limited to, periodic reports which shall be filed at least quarterly with the appropriate local office or, where the contractor has more than one hiring location in a State, with the central office of that State employment service. Such reports shall indicate for each hiring location (1) the number of individuals hired during the reporting period, (2) the number of nondisabled veterans of the Vietnam era hired, (3) the number of disabled veterans of the Vietnam era hired, and (4) the total number of disabled veterans hired. The reports should include covered veterans hired for on-the-job training under 38 USC 1787. The contractor shall submit a report within 30 days after the end of each reporting period wherein any performance is made on this contract identifying data for each hiring location. The contractor shall maintain at each hiring location copies of the reports submitted until the expiration of one year after final payment under the contract, during which time these reports and related documentation shall be made available, upon request, for examination by any authorized representatives of the contracting officer or of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment and placement.

(e) Whenever the contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the contractor is contractually bound to these provisions and has so advised the State system, there is no need to advise the State system of subsequent contracts. The contractor may advise the State system when it is no longer bound by this contract clause.

(f) This clause does not apply to the listing of employment openings which occur and are filled outside of the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

(g) The provisions of paragraphs (b), (c), (d) and (e) of this clause do not apply to openings which the contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of his own organization or employer-union arrangement for that opening.

(h) As used in this clause: (1) "All suitable employment openings" includes, but is not limited to, openings which occur in the following job categories: production and nonproduction; plant and office; laborers and mechanics; supervisory and nonsupervisory; technical; and executive, administrative, and professional openings as are compensated on a salary basis of less than $25,000 per year. This term includes full-time employment, temporary employment of more than 3 days duration, and part-time employment. It does not include openings which the contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances an employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State employment service system" means the local office of the Federal-State national system of public employment offices with assigned responsibility for serving the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the contractor proposes to fill from within his own organization" means employment openings for which no consideration will be given to persons outside the contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the contractor proposes to fill pursuant to a customary and traditional employer-union hiring arrangement" means employment openings which the contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the contractor and representatives of his employees.

(i) The contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(j) In the event of the contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(k) The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notice shall state the contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

(l) The contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the contractor is bound by the terms of the Vietnam Era Veterans Readjustment Assistance Act, and is committed to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam Era.

(m) The contractor will include the provisions of this clause in every subcontract or purchase order of $10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

EXEMPTION CLAUSE

Our contract with The Anaconda Company, ALUMINUM DIVISION is exempt from the Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era required under Section 402 of the Vietnam Era Veterans Readjustment Assistance Act of 1974.

_____
(Signature)

_____
(Title)

_____
(Date)

Slama Associated, Inc.
(Company Name)

By: Richard W. Slama
(Signature)

Pres.
(Title)

Date: 11/17/81

PROJECT DESCRIPTION

Project Description

This project will include a completed steel clear span storage building 100 feet wide by 300 feet long. The building sidewalls will be 16 feet high. 2 feet 6 inches of the 16 foot sidewall will be an 8 inch concrete base wall. The building will have three 14 feet wide by 14 feet high metal roll-up truck doors - two with manual operators, one with an electric operator; two metal man doors; fully reinforced concrete floor and foundation; reinforced concrete truck ramp, foundation, ramp drain drywell, and loading dock-platform; blacktop driveway to east truck door; interior lighting, motorized roof ventilators; provisions for the later addition of a dry sprinkler system (not a part of this building contract); and complete electrical distribution center.

AAC Drawings E-829
AAC Drawings E-830

GENERAL SPECIFICATIONS

General Specifications

Contractor to supply the following minimum number of drawings and written specifications:

Electrical wiring diagrams
Detailed building drawings (may be manufacturer prints)

The following are desireable to have:

Any and all prints made by contractor(s) beyond those listed above.
Any and all vendor prints for roll-up doors, ventilating units, lights, etc.

Complete operating manuals, parts lists, and service manuals shall be provided by the contractor for the metal roll-up doors, manual and electric operators for said doors, and roof ventilating units.

The building must be water resistant. All roofing, siding, door, and ventilator openings must be properly assembled and flashed so that there is no water leakage.

The building should be constructed so that a complete dry sprinkler system can be added at a later date with minimal interference.

The building shall sustain the following loading:

Wind load - 25 pounds per square feet minimum
Live roof load - 50 pounds per square foot minimum

The building shall meet all O.S.H.A. specifications and requirements; it shall also meet all Uniform Building Code specifications. In particular, all exits must be properly marked and lighted. All areas requiring hand rail protection shall be so constructed. Ice protection must be provided over all doors. Other areas covered under the above codes shall be constructed so as to fulfill these codes.

Commercially manufactured metal buildings may deviate from the enclosed specifications covering metal work, structural, finishing, painting, and other specific areas except electrical with the engineer's (AAC) approval. Complete specifications regarding the building's construction and materials shall be provided with the bid.

The building's appearance shall be aesthetically pleasing. Sample photographs or pictures of the building's exterior must be submitted with the bid.

The complete foundation and building - all components included - shall be warranted for a minimum of one year from completion of construction. The roof shall be warranted from leakage for the manufacturer's standard period of time. This information shall be provided with the bid.

GENERAL CONTRACT TECHNICAL SPECIFICATIONS

MECHANICAL

ELECTRICAL

General Contract Technical Specifications

Mechanical

1. Site Preparation

    1.A. Site Clearing
    1.B. Excavating, Filling, Grading, and Compaction

2. Concrete

    2.A. Concrete Work
    2.B. Asphalt Concrete Paving

3. Masonry

    3.A. Unit Masonry Work

4. Thermal and Moisture Protection

    4.A. Joint Sealers

5. Metal

    5.A. Structural Steel
    5.B. Steel Joists
    5.C. Metal Roof Decking
    5.D. Miscellaneous Metal

6. Doors, Windows, and Frames

    6.A. Standard Steel Doors and Frames
    6.B. Finish Hardware
    6.C. Overhead Doors
    6.D. Glass and Glazing

7. Finishes

    7.A. Finishes on Commercial Metal Buildings
    7.B. Painting

8. Mechanical

    8.A. Ventilation
    8.B. Temperature Control
    8.C. Plumbing
    8.D. Correlation Between Mechanical and Electrical Sub-Contracts

General Contract Technical Specifications

Electrical

General

Raceways

Wire and Cables

Grounding System

Dry Type Transformers

Branch Circuit Panelboards

Lighting

1. SITE PREPARATION

SECTION 1.A.- SITE CLEARING

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of site clearing is shown on the drawings.

Site clearing work includes, but is not limited to, the following:

Removal of trees and other vegetation.
Topsoil stripping.
Clearing and grubbing.
Removing above-grade improvements.
Removing below-grade improvements.

Related Work Specified Elsewhere:

Excavation, Filling and Grading: Section 1.B.

JOB CONDITIONS:

Protection of Existing Improvements:

Provide protections necessary to prevent damage to existing improvements indicated to remain in place.

Restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

PART 2 - PRODUCTS:

Not applicable.

PART 3 - EXECUTION:

SITE CLEARING:

General:

Remove vegetation, improvements, or obstructions shown to be removed or which interfere with installation of new construction. Remove such items elsewhere on the site or premises as specifically indicated. Removal includes stumps and roots.

Topsoil:

Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

Strip topsoil to whatever depths encountered in a manner to prevent intermingling with the underlying subsoil or other objectionable material.

Remove heavy growths of grass from areas before stripping.

Stockpile topsoil in storage piles in areas shown, or where otherwise directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

Clearing and Grubbing:

Clear the site of shrubs and other vegetation, except for that indicated to be left standing (if any).

Completely remove stumps, roots, and other debris protruding through the ground surface.

Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

Place fill material in horizontal layers not exceeding 6" loose depth, and thoroughly compact to a density equal to adjacent original ground.

Removal of Improvements:

Remove above-grade and below-grade improvements necessary to permit construction, and other work as indicated.

The abandonment or removal of certain underground pipe or conduits may be shown on mechanical or electrical drawings, and is included under work of those sections.

DISPOSAL OF WASTE MATERIALS:

Burning on Owner's Property:

Burning is not permitted on the Owner's property.

Removal from Owner's Property:

Remove waste materials and unsuitable topsoil from the Owner's property and dispose of legally.

SECTION 1.B.- EXCAVATING, FILLING, GRADING, AND COMPACTION

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of excavation, filling and grading is shown on the drawings.

Preparation of subgrade for building slabs and walks is included as part of this work.

Base course fill for support of building slabs, asphaltic pavement and heliport is included as part of this work.

Related Work Specified Elsewhere:

Site Clearing: Section 1.A.
Asphalt Concrete Paving: Section 2.B.
Concrete for Structures: Section 2.A.

QUALITY ASSURANCE:

Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

Testing and Inspection Services:

Employ, at Contractor's expense, a testing laboratory acceptable to Architect/Engineer to perform soil testing and inspection service for quality control testing during earthwork operations.

SUBMITTALS:

Test Reports - Excavating, Filling and Grading:

Submit 2 copies of the following reports directly to the Architect/Engineer from the testing services, with copy to the Contractor.

Field density test reports.
One optimum moisture-maximum density curve for each type of soil encountered to be used or borrowed material to be used as compacted backfill.

JOB CONDITIONS:

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS:

SOIL MATERIALS:

Definitions:

Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.

Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7; also, peat and other highly organic soils.

Base Course Material: (0-10 percent minus #200 mesh sieve) 3" minus gravel.

Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

PART 3 - EXECUTION:

EXCAVATION:

Excavation consists of removal and disposal of material encountered when establishing required grade elevations. All material shall be considered unclassified for excavation purposes.

Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect/Engineer. Unauthorized excavation, as well as remedial work directed by the Architect/Engineer, shall be at the Contractor's expense.

Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.

Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, under cutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sump, suction and discharge lines, and other dewatering components necessary to convey water away from excavations.

Convey water to run-off areas. Do not use trench excavations as temporary drainage ditches.

Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

COMPACTION:

General:

Perform the compaction of soil materials for backfills and fills using suitable soil compaction equipment for the materials to be compacted and the work area locations.

Control soil compaction during construction for compliance with the percentage of maximum density obtained by ASTM Method D 698 for each area classification.

Percentage of Maximum Density Requirements:

Provide not less than the following percentages of the maximum density of the specified soil material compacted at optimum moisture content.

> Building Slabs, Steps, Concrete Walks and Asphaltic Pavement: Compact top of subgrade and each fill layer using base course material only at 95 percent maximum density.
>
> Lawn Areas: Compact each layer of backfill or fill material at 90 percent maximum density for cohesionless soils, and 85 percent maximum density for cohesive soil material.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

BACKFILL AND FILL:

General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations, use satisfactory excavated or borrow material.

Under grassed areas, use satisfactory excavated or borrow material.

Under building slabs and walks, use base course material only, 6" minimum depth.

Under asphaltic concrete pavement, use base course material only, 6" minimum depth.

Backfill excavations as promptly as work permits, but not until completion of the following:

Acceptance by Architect/Engineer of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

Inspection, testing, approval, and recording locations of underground utilities.

Placement and Compaction: Place backfill and fill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.

GRADING:

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

Lawn or Seeded Areas: Finish areas to receive topsoil to within not more than 0.10' above or below the required subgrade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below the required subgrade elevation.

Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.

Compaction:

After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

FIELD QUALITY CONTROL:

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.

Tests of the subgrades and fill layers shall be taken as follows:

Building Slabs, Sidewalks, and Pavement: Make one field density test in each compacted fill layer for each 5,000 square feet of overlaying finished area, but in no case less than two tests per layer.

Exterior Foundation Wall Backfill: Make a minimum of 4 field density tests for each separate new structures.

Location: Location of tests shall be as determined by the Architect/Engineer.

If, based on reports of the testing service and inspection, the subgrade or fills fall below the specified density, additional compaction and testing will be required at Contractor's expense, until specified density is reached.

MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion, and keep free of trash and debris.

Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed

2. CONCRETE

SECTION 2.A.- CONCRETE WORK

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of concrete work is shown on the drawings.

QUALITY ASSURANCE:

Codes and Standards:

Comply with the provisions of the following codes, specifications and standards, except where more stringent requirements are shown or specified:

ACI 301 "Specifications for Structural Concrete for Buildings".

ACI 311 "Recommended Practice for Concrete Inspection".

ACI 318 "Building Code Requirements for Reinforced Concrete".

ACI 347 "Recommended Practice for Concrete Formwork".

ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".

Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

Workmanship:

The Contractor is responsible for correction of concrete work which does not conform to the specified requirements, including strength, tolerances and finishes. Correct deficient concrete as directed by the Architect/ Engineer.

Concrete Testing Service: Employ, at Contractor's expense a testing laboratory acceptable to Architect/Engineer to perform material evaluation tests and to design concrete mixes.

Materials and installed work may require testing and retesting, as directed by the Architect/Engineer, at anytime during the progress of the work. Allow free access to material stockpiles and facilities at all times. Tests, not specifically indicated to be done at the Owner's expense, including the retesting of rejected materials and installed work, shall be done at the Contractor's expense.

Tests for Concrete Materials:

Test aggregates by method of sampling and testing of ASTM C 33.

For portland cement, sample the cement and determine the properties by the methods of test of ASTM C 150.

Submit written reports to the Architect/Engineer, for each material sampled and tested, prior to the start of work. Provide the project identification name and number, date of report, name of contractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to the Architect/Engineer. Certificates of compliance must be signed by the materials producer and the Contractor.

SUBMITTALS:

Manufacturer's Data; Concrete Work:

Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, chemical floor hardeners, dry-shake finish materials, and others as requested by the Architect/Engineer.

Shop Drawings; Concrete Reinforcement:

Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with the ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, diagrams of bent bars, arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.

Laboratory Test Reports; Concrete Work:

Submit 2 copies of laboratory test reports for mix design and quality control tests as specified.

Material Certificates; Concrete Work:

Provide material certificates in lieu of material laboratory test reports only when permitted by the Architect/Engineer. Material certificates shall be signed by the manufacturer and the Contractor, certifying that each material item complies with, or exceeds, the specified requirements.

PART 2 - PRODUCTS:

FORM MATERIALS:

Forms for Exposed Finish Concrete: Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

Use plywood complying with U. S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible trademark of an approved inspection agency.

Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

Form Coatings:

Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound.

REINFORCING MATERIALS:

Reinforcing Bar (ReBar): ASTM A 615, and as follows:

Provide Grade 40 or 60, except where otherwise shown, for bars No. 3 to 18.

Provide No. 2 reinforcing, round carbon steel bars, ASTM A 306, Grade 80.

Dowels Floor Construction Joints: Round carbon steel bars complying with ASTM A 306, Grade 80.

Steel Wire: ASTM A 82, plain, cold-drawn, steel.

Welded Wire Fabric (WWF): ASTM A 185, welded steel wire fabric, 6 x 6 #10 mesh.

Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Wood, brick and other devices will not be acceptable.

For slabs-on-grade, use supports with sand plates or horizontal runners where wetted base material will not support chair legs.

CONCRETE MATERIALS:

Portland Cement: ASTM C 150, Type 1, unless otherwise acceptable to Architect/Engineer.

Normal Weight Aggregates: ASTM C 33, and as herein specified. Provide aggregates from a single source for all exposed concrete.

Local aggregates not complying with ASTM C 33 but which have shown by special test or actual service to produce concrete of adequate strength and durability may be used when acceptable to the Architect/ Engineer.

Fine Aggregate: Clean, sharp, natural sand free from loam, clay lumps or other deleterious substances.

Dune sand, bank-run sand and manufactured sand are not acceptable.

Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam or foreign matter, as follows:

Crushed stone, processed from natural rock or stone.

Washed gravel, either natural or crushed. Use of pit or bankrun gravel is not permitted.

Maximum Aggregate Size:

Footings and foundations - 1-1/2".

Slabs on grade, walks, and other concrete - 3/4".

Water: Clean, fresh, drinkable.

Air-Entraining Admixture: ASTM C 260.

Calcium chloride will not be permitted in concrete, unless otherwise authorized in writing by Architect/Engineer.

RELATED MATERIALS:

Preformed Expansion Joint Fillers: See 7T-Series sections.

Joint Sealing Compound: See 7T-Series sections.

Moisture Barrier:

Provide moisture barrier cover over prepared base material where shown on

drawings. Use only materials which are resistant to decay when tested in accordance with ASTM E 154, as follows:

Polyethylene sheet not less than 8 mils thick.

Chemical Hardener: Colorless aqueous solution containing a blend of magesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lbs. of fluosilicates per gallon.

Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHO M 182, Class 3.

Moisture-Retaining Cover: One of the following, complying with ASTM C 171.

Waterproof paper.
Polyethylene film.
Polyethylene-coated burlap.

PROPORTIONING AND DESIGN OF MIXES:

Prepare design mixes for each type and strength of concrete in accordance with applicable provisions of ASTM C 94. Use an independent testing facility acceptable to the Architect/Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to the Architect/Engineer.

Submit written reports to the Architect/Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by the Architect/Engineer.

Design mixes to provide normal weight concrete with the following properties:

3000 psi 28-day compressive strength; 480 lbs. cement per cu. yd. minimum; W/C ratio, 0.58 maximum.

Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to the Owner and as accepted by the Architect/Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by the Architect/Engineer before using in the work.

Admixtures:

Use air-entraining admixture in exterior exposed concrete, unless otherwise indicated. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:

Concrete structures and slabs exposed to freezing and thawing or subject to hydraulic pressure:

4% for maximum 2" aggregate.
6% for maximum 3/4" aggregate.

Other Concrete: 2% to 4% air.

Slump Limits:

Proportion and design mixes to result in concrete slump at the point of placement as follows:

Ramps and Sloping Surfaces: Not more than 3".

Reinforced Foundation Systems: Not less than 1" and not more than 3".

All Other Concrete: Not less than 1" and not more than 4".

CONCRETE MIXING:

Ready-Mix Concrete: Comply with the requirements of ASTM C 94, and as herein specified.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.

When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 1-1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

PART 3 - EXECUTION:

FORMS:

Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

Construct forms complying with ACI 347, to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features

required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

Chamfer exposed corners and edges as shown, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

Form Ties: Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

Unless otherwise shown, provide ties so portion remaining within concrete after removal is at least 1-1/2" inside concrete.

Unless otherwise shown, provide form ties which will not leave holes larger than 1" diameter in concrete surface.

Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms or other debris just before concrete is placed. Retighten forms after concrete placement if required to eliminate mortar leaks.

PLACING REINFORCEMENT:

Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

Place reinforcement to obtain at least the minimum coverages for concrete

protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Do not place reinforcing bars more than 2" beyond the last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

JOINTS:

Construction Joints: Locate and install construction joints, which are not shown on the drawings, so as not to impair the strength and appearance of the structure, as acceptable to the Architect/Engineer.

Provide keyways at least 1-1/2" deep in all construction joints in walls, slabs and between walls and footings; accepted bulkheads designed for this purpose may be used for slabs. Floor slab will not be keyed into columns or walls. Ramp slab will not be keyed into ramp walls.
Place construction joints perpendicular to the main reinforcement. Continue all reinforcement across construction joints.

Isolation Joints in Slabs-On-Ground: Construct isolation joints in slabs on ground at all points of contact between slabs on ground and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated.

> Joint filler and sealant materials are specified in the 7T-Series sections of these specifications.

Control Joints in Slabs-On-Ground: Construct control joints in slabs-on-ground to form panels of patterns as shown. Use inserts 1/4" wide x 1/5 to 1/4 of the slab depth, unless otherwise shown.

Form control joints by inserting a premolded hardboard or fiberboard strip into the fresh concrete until the top surface of the strip is flush with the slab surface. After the concrete has cured, remove inserts and clean groove of loose debris.

> Joint sealant material is specified in the 7T-Series section of these specifications.

INSTALLATION OF EMBEDDED ITEMS:

General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.

Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain the required elevations and contours in the finished slab surface. Provide and secure units sufficiently strong to support the types of screed strips by the use of strike-off templates or accepted compacting type screeds.

PREPARATION OF FORM SURFACES:

Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of the form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

CONCRETE PLACEMENT:

Preplacement Inspection: Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required. Thoroughly wet wood forms immediately before placing concrete, as required where form coatings are not used.

Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

General: Comply with ACI 304, and as herein specified.

Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions.

Do not use vibrators to transport concrete inside of forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the placed layer of concrete and at least 6" into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit the duration of vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation of the mix.

Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.

Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Bring slab surfaces to the correct level with a straightedge and strike off.

Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.

Maintain reinforcing in the proper position during concrete placement operations.

Cold Weather Placing:

Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

When air temperature has fallen to or is expected to fall below 40 degrees F., uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degrees F., and not more than 80 degrees F. at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

Hot Weather Placing:

When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

Wet forms thoroughly before placing concrete.

Do not use retarding admixtures unless otherwise accepted in mix designs.

FINISH OF FORMED SURFACES:

Rough Form Finish (RfFm-Fn): For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

Smooth Form Finish (SmFm-Fn): For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to the concrete, or a covering material applied directly to the concrete, or a covering material bonded to the concrete, such as waterproofing, dampproofing, painting or other similar system. This is the as-cast concrete surface as obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with all fins or other projections completely removed and smoothed.

Grout Cleaned Finish (GrtCl-Fn): Provide grout cleaned finish (GrtCl-Fn) to scheduled concrete surfaces which have received smooth form finish (SmFm-Fn) treatment.

Combine one part portland cement to 1-1/2 parts fine sand by volume, and mix with water to the consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that the final color of dry grout will closely match adjacent surfaces.

Thoroughly wet concrete surfaces and apply grout immediately to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

Related Uniformed Surfaces:

At tops of walls, horizontal offsets and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise shown.

MONOLITHIC SLAB FINISHES:

Scratch Finish (Scr-Fn): Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for quarry tile as shown on the drawings.

After placing slabs, plane surface to a tolerance not exceeding 1/4" in 2' when tested with a 2' straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

Float Finish (Flt-Fn): Apply float finish to monolithic slab surfaces that are to receive trowel finish and other finishes as hereinafter specified.

After screeding and consolidating concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding 1/4" in 10' when tested with a 10' straightedge. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

Trowel Finish (Tr-Fn): Apply trowel finish to monolithic slab surfaces that are to be exposed-to-view, unless otherwise shown, and slab surfaces that are to be covered with resilient flooring, paint or other thinfilm finish coating system.

After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge. Grind smooth surface defects which would telegraph through applied floor covering system.

Non-Slip Broom Finish (NSBrm-Fn): Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as shown on drawings or in schedules.

Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with the Architect/Engineer before application.

Chemical-Hardener Finish (ChHd-Fn): Apply chemical-hardener finish to interior concrete floors where shown on drawings or in schedules. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water, and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat, and allow 24 hours for drying between coats.

Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.

After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

CONCRETE CURING AND PROTECTION:

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant

temperature for a period of time necessary for hydration of cement and proper hardening.

Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by membrane curing, and by combinations thereof, as herein specified.

Provide moisture curing by following methods:

Keep concrete surface continuously wet by covering with water.

Continuous water-fog spray.

Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

Provide moisture-cover as follows:

Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

REMOVAL OF FORMS:

Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

Formwork supporting weight of concrete, such as beam soffits, joints, slabs and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28-days. Determine potential compressive strength of inplace concrete by testing field-cured specimens representative of concrete location or members.

RE-USE OF FORMS:

Clean and repair surfaces of forms to be re-used in the work. Split, frayed,

delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact form surfaces as specified for new formwork.

When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect/Engineer.

MISCELLANEOUS CONCRETE ITEMS:

Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

CONCRETE SURFACE REPAIRS:

Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Architect/Engineer.

QUALITY CONTROL TESTING DURING CONSTRUCTION:

The Contractor shall employ a testing laboratory to perform all tests and to submit test reports.

Sampling and testing for quality control during the placement of concrete as follows:

Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.

Air Content: ASTM C 173, volumetric method for lightweight concrete; ASTM C 231 pressure for normal weight concrete; one for each set of compressive strength test specimens.

Compression Test Specimen: ASTM C 31; one set of 3 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

Compressive Strength Tests: ASTM C 39; one set for each 25 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 1,500 sq. ft. of surface area placed; 1 specimen tested at 7 days, 1 specimen tested at 28 days, and 1 specimen retained in reserve for later testing if required.

When the strength of field-cured cylinders is less than 85% of

companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

Test results will be reported in writing to the Architect/Engineer and the Contractor on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect/Engineer. The testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

SECTION 2.B. - ASPHALT CONCRETE PAVING

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of asphalt concrete paving is shown on the drawings.

Prepared base course is specified in 1.B., "Excavating, Filling, Grading and Compaction".

SUBMITTALS:

Material Certificates: Asphalt Concrete Paving:

Provide 2 copies of material certificates signed by the material producer and the Contractor, certifying that each material item complies with, or exceeds, specified requirements.

JOB CONDITIONS:

Weather Limitations: Apply prime and tack coats only when ambient temperature is above 50 degrees F., and when temperature has not been below 35 degrees F. for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

Construct asphalt concrete surface course only when atmosphereic temperture is above 40 degress F., and when base is dry.

Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS:

MATERIALS:

General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

Leveling Course Aggregate: 2" thick, 3/4" minus, sound, angular crushed stone, or crushed gravel.

Surface Course Aggregate: Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand.

Mineral Filler: Limestone dust, portland cement, or other inert material complying with ASTM D 242 or AASHO M 17.

Asphalt Cement: Comply with ASTM D 936 as follows:

Penetration Grade: 60-70

Prime Coat: Cut-back asphalt type.

Tack Coat: Emulsified aspahlt.

PART 3 - EXECUTION:

INSPECTION:

Paver must examine the areas and conditions under which asphalt concrete paving is to be installed. Notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the paver.

Proof roll prepared base course surface to check for unstable areas and areas requiring additional compaction.

Apply the leveling course and compact to 95 percent maximum density by power rollers weighing not less than 10 tons, and hand tampers not less than 50 pounds. Spread uniformly from spreader boxes, level to the required contour by blade graders and compact to density and thickness specified.

PLACING THE MIX:

General: Place asphalt concrete mixture on prepared surface, spread and strike off. Spread mixture at minimum temperature of 225 degrees F. Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

Paver Placing: Place in strips not less than 10' wide and 4" thick. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

Joints: Construct joints to have same texture, density and smoothness as previously laid asphalt concrete surface. Clean contact surfaces and apply tack coat.

ROLLING:

General: Begin rolling when mixture will bear roller weight without excessive displacement.

Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

Breakdown Rolling: Accomplish breakdown or intitial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displace areas by loosening and filling, if required, with hot material.

Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

Finish Rolling: Perform finish folling while mixture is still warm enough for removal of roller marks. Continue rolling until all roller marks are eliminated and the course has attained maximum density.

Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

Protection: After final rolling, do not permit vehicular traffic of pavement until it has cooled and hardened.

FIELD QUALITY CONTROL:

General: Test the in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect/Engineer.

Thickness: In-place compated thickness will not be acceptable if exceeding following allowable variation from required thickness:

Leveling Course: 1/2" plus or minus.

Surface Course: 1/4" plus or minus.

Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerance for smoothness.

Wearing Course Surface: 1/2"

Check surface areas at intervals as directed by Architect/Engineer.

3. MASONRY

SECTION 3.A.- UNIT MASONRY WORK

PART 1 - GENERAL

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of each type of unit masonry work is shown on the drawings.

QUALITY ASSURANCE:

Fire-Rated Masonry: Wherever a fire-resistance classification is shown or scheduled for unit masonry construction (4-hr., 3-hr., and similar designations), comply with the requirements for materials and installation established by governing authorities for the construction shown.

CONSTRUCTION TOLERANCES:

Variation from Plumb: For lines and surfaces of columns, walls, and arises, do not exceed 1/4" in 10' or 3/8" in 20' maximum.

Variation from Level: For lines of exposed lintels, sills, parapets and other conspicuous lines, do not exceed 1/4" in 20' nor 3/4" in 40' or more.

Variation in Cross Section Dimensions: For columns and thickness of walls, do not exceed minus 1/4" nor plus 1/2".

SUBMITTALS:

Samples; Unit Masonry:

Submit 3 samples of each type of exposed concrete masonry units and brick required. Include in each set the full range of exposed color and texture to be expected in the completed work. Architect/Engineer's review will be for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

Brick shall match existing size and color.

JOB CONDITIONS:

Protection of Work: During erection, cover top of wall with heavy water-proof sheeting at end of each days' work. Cover partially completed structures when work is not in progress.

Extend cover a minimum of 24 inches down both sides and hold cover securely in place.

Do not apply uniform floor or roof loading for at least 12 hours after building masonry walls or columns.

Do not apply concentrated loads for at least 3 days after building masonry walls or columns.

Staining: Prevent grout or mortar from staining the face of masonry to be left exposed or painted. Remove immediately grout or mortar in contact with such masonry.

Cold Weather Protection:

Remove any ice or snow formed on masonry bed by carefully applying heat until top surface is dry to the touch.

Remove all masonry determined to be frozen or damaged by freezing conditions.

Perform the following construction procedures while the work is progressing:

When air temperature is from 40 degrees F to 32 Degrees F, heat sand or mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F.

When air temperature is from 32 degrees F to 25 degrees F, heat sand or water to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing.

When air temperature is from 25 degrees F to 20 degrees F, heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F; maintain temperature of mortar on boards above freezing; use salamanders or other heat sources on both sides of walls under construction; use wind breaks when wind is in excess of 15 mph.

When air temperature is 20 degrees F and below, heat sand and mixing water to produce mortar temperatures between 40 degrees F and 120 degrees F; provide enclosures and auxiliary heat to maintain air temperature above 32 degrees F; do not lay units which have a surface temperature of 20 degrees F.

Perform the following protections for completed masonry and masonry not being worked on:

When the mean daily air temperature is from 40 degrees F to 32 degrees F, protect masonry from rain or snow for at least 24 hours by covering with weather-resistive membrane.

When mean daily air temperature is from 32 degrees F to 25 degrees F, completely cover masonry with weather-resistive membrane for at least 24 hours.

When mean daily air temperature is from 25 degrees F to 20 degrees F, completely cover masonry with insulating blankets or similar protection for at least 24 hours.

When mean daily temperature is 20 degrees F and below, maintain masonry temperature above 32 degrees F for 24 hours using enclosures and supplementary heat, electric heating blankets, infrared lamps, or other acceptable methods.

PART 2 - PRODUCTS:

MASONRY UNITS, GENERAL:

Manufacturer: Obtain masonry units from one manufacturer, of uniform texture and color for each kind required, for each continuous area and visually related areas.

BRICK:

Size: To match existing.

Acceptable Manufacturer: IXL Industries, Medicine Hat, Alberta; Interpace, Mica, WA

Coring: At Contractor's option, provide solid brick, cored or uncored, for vertical brickwork. Do not use cored brick with net cross-sectional area less than 75% of gross area in the same plane or with core holes closer than 3/4" from any edge.

Quality Standard: ASTM C 216.

Grade SW for exterior exposures.
Type FBS
Texture and Color: To match existing.

CONCRETE MASONRY UNITS (CMU):

Size: Manufacturer's standard units with nominal face dimensions of 16" long x 8" (15-5/8" x 7-5/8" actual), unless otherwise indicated.

Special Shapes: Provide where required for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.

Hollow Load-Bearing (HL) CMU: Comply with ASTM C 90 and as follows:

Grade N for general use in exterior walls above and below grade that may or may not be exposed to moisture penetration or the weather, and for interior walls and backup.

Hollow Non-Load-Bearing (HN) CMU: Comply with ASTM C 129.

Provide lightweight units using ASTM C 331 aggregate for a dry net weight of not more than 105 lbs. per cu. ft.

Curing:

Cure units in a moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C 90 Type I requirements.

Exposed Face:

Provide manufacturer's standard color and texture, unless otherwise indicated.

MORTAR MATERIALS:

Portland Cement: ASTM C 150, Type I, except Type III may be used for cold weather construction. Provide natural color cement.

Grout Aggregate: ASTM C 404, size No. 8 or size No. 89.

Hydrated Lime: ASTM C 207, Type S.

Sand: ASTM C 144, except for joints less than 1/4", use aggregate graded with 100 percent passing the No. 16 sieve.

Water: Clean, drinkable.

MASONRY ACCESSORIES:

Continuous Wire Reinforcing and Ties for Masonry:

Provide welded wire units prefabricated in straight lengths of not less than 10', with matching corner and tee units. Fabricate from cold-drawn steel wire complying with ASTM A 82, with deformed continuous side rods and plain cross-rods, and a unit width of 1-1/2" to 2" less than thickness of wall or partition.

Provide units (Brick to back up ties) as follows:

Truss type fabricated with single pair of 9 ga. side rods and 9 ga. continuous diagonal cross-rods spaced not more than 16" o.c.

For concrete masonry back-up fabricate units with additional side rods spaced for embedment in inside face of back-up wythe.

For exterior walls, hot-dip galvanize after fabrication with 1.5 oz. zinc coating, ASTM A 153, Class B2.

Anchors and Ties:

Provide straps, bars, bolts and rods fabricated from not less than 16 ga.

sheet metal or 3/8" diameter rod stock, unless otherwise indicated.

For devices which extend into exterior wythe, fabricate from steel with hot-dip galvanized coating, ASTM A 153, Class B1, B2, or B3.

Flashings for Masonry:

Provide concealed flashings as follows:

Copper-Fabric Laminate: Copper bonded to asphalt impregnated cotton fabric both sides.

Miscellaneous Masonry Accessories:

Reinforcing Bars: Deformed steel, ASTM A 615, Grade 60 of the sizes shown.

Bond Breaker Strips: 15-lb. asphalt roofing felt complying with ASTM D 226, or 15-lb. coal-tar roofing felt complying with ASTM D 227.

Plastic Weepholes: Unless otherwise indicated, provide 1/4" round x 4" long medium density polyethylene plastic tubes to form weepholes.

PART 3 - EXECUTION:

INSPECTION:

Masonry Installer must examine the areas and conditions under which masonry is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Masonry Installer.

INSTALLATION, GENERAL:

Thickness: Build masonry construction to the full thickness shown, except, build single-wythe walls (if any) to the actual thickness of the masonry units, using units of nominal thickness shown or specified.

Build chases and recesses as shown and as required for the work of other trades. Provide not less than 8" of masonry between chase or recess and jamb of openings, and between adjacent chases and recesses.

Cut masonry units with motor-driven saw designed to cut masonry with clean sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible.

Wet clay brick having ASTM C 67 absorption rates greater than 0.025 oz. per sq. in. per minute.

Do not wet concrete masonry units.

Frozen Materials and Work: Do not use frozen materials or materials mixed or coated with ice or frost. For masonry which is specified to be wetted, comply with the BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

Do not lower the freezing point of mortar by use of admixtures or antifreeze agents.

Do not use calcium chloride in mortar or grout.

Pattern Bond:

Brick: Match coursing, bonding, color and texture of new masonry work with existing work (unless otherwise shown).

CMU: Running bond.

Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths and to properly locate openings, movement-type joints, returns and offsets. Avoid the use of less-than-half-size units at corners, jambs and wherever possible at other locations.

Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work.

Stopping and Resuming Work:

Rack back 1/2-masonry unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if specified to be wetted), and remove loose masonry units and mortar prior to laying fresh masonry.

Built-In Work:

As the work progresses, build-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items.

Fill space between hollow metal frames and masonry solidly with mortar.

Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

Non-Bearing Interior Partition Walls: Build full height of story to underside of solid structure above, unless otherwise indicated.

MORTAR BEDDING AND JOINTING:

Mortar Mixes: ASTM C 270, Proportion Specifications, and of the following types:

Use Type S mortar for exterior above grade loadbearing and non-loadbearing walls, parapet walls, and for interior loadbearing walls and non-loadbearing partitions.

Grout Mix: Comply with the proportion requirements of ASTM C 476 and with the following:

> Proportion by Volume: One part portland cement, zero to 1/10 part lime and fine aggregate (sand) equal to 2-1/4 to 3 times the sum of the volumes of cement and lime materials and course aggregate equal to 1 to 2 times the volume of cement and sand.

Batch Control:

Measure and batch materials either by volume or weight, such that the required proportions for mortar can be accurately controlled and maintained. Measurement of sand exclusively by shovel will not be permitted.

Mix mortars with the maximum amount of water consistent with workability to provide maximum tensile bond strength within the capacity of the mortar.

Mix mortar and grout ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clean and free of deleterious materials which would impair the work. Do not use mortar which has begun to set, or if more than 2-1/2 hours has elapsed since initial mixing. Retemper mortar during 2-1/2 hr. period as required to restore workability.

Lay brick and other solid masonry units with completely filled bed, head and collar joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.

Joints: Maintain joint widths shown, except for minor variations required to maintain bond alignment. If not otherwise indicated, lay walls with 3/8" joints, 1/2" for brick. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. Tool exposed joints slightly concave. Rake out mortar in preparation for application of calking or sealants where shown.

Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

CAVITY WALLS:

Keep cavity and wall chases clean of mortar droppings and other materials during construction. Strike joints facing cavity, flush. Note cavity between wythe to be filled with board insulation as detailed.

Tie exterior wythe to back-up with continuous horizontal joint reinforcing or strap ties embedded in mortar joints at not more than 24" o.c. vertically, for strap ties 24" o.c. both ways.

Provide weep holes in exterior wythe of cavity, composite and veneer walls located immediately above ledges and flashing, spaced 2'-0" o.c., unless otherwise indicated.

Reinforce masonry openings greater than 1'-0" wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8" apart, both immediately above the lintel and below the sill. Extend reinforcing a minimum of 2'-0" beyond jambs of the opening, bridging control joints where provided.

Masonry Reinforcing: Reinforce all masonry walls with reinforcing steel in bond beams of sizes and spaces shown on the drawings.

Grouting CMU Cores at Vertical Reinforcing:

Pour grout using container with spout or chute. Rod grout during placement.

Place grout continuously; do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2" below top course of pour.

Bond Beams: Stop grout in vertical cells 1-1/2" below bond beam course. Place horizontal bond beam, lap at corners and intersections. Place grout in bond beam course before filling vertical cores above bond beam.

Contractor's Option: High-lift grouting technique (pumping method) may be used.

LINTELS:

Install loose lintels of steel and other materials where shown.

Provide masonry lintels where shown and wherever openings of more than 1'-0" are shown without structural steel or other supporting lintels. Provide precast or formed-in-place masonry lintels. Thoroughly cure precast lintels before handling and installation. Temporarily support formed-in-place lintels.

For hollow concrete masonry unit walls, use specially formed "U"-shaped lintel units with reinforcing bars placed as shown and filled with Type M mortar or concrete grout.

Provide minimum bearing at each jamb, of 4" for openings less than 6'-0" wide, and 8" for wider openings.

CONTROL AND EXPANSION JOINTS:

Provide vertical expansion, control and isolation joints in masonry where shown. Build-in related masonry accessory items as the masonry work progresses.

See 7T-Series sections for "Sealants and Calking".

Control Joint Spacing: If location of control joints is not shown, place vertical joints spaced not to exceed 40'-0" o.c. for concrete masonry reinforced wythes.

Install reglets and nailers for flashing and other related work where shown to be built into masonry work.

REPAIR, POINTING AND CLEANING:

Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints at corners, openings and adjacent work to provide a neat, uniform appearance, properly prepared for application of calking or sealant compounds.

Clean exposed brick masonry surfaces by the bucket and brush hand cleaning method or by high pressure water method.

Use commercial cleaning agents in accordance with manufacturer's instructions.

Clean exposed CMU masonry by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings.

Water-repellent for exterior masonry walls is specified under Section 9TO "Painting".

4. THERMAL AND MOISTURE PROTECTION

SECTION 4.A.- JOINT SEALERS

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of each type of joint sealer is indicated on the drawings.

Further seal and caulk all joints between masonry and window and door frames, under sills, copings, and wherever sealant and caulking is needed but not specifically noted. Use of caulking compounds shall be restricted to interior use and only where necessary to paint over joint.

The required applications include, but are not necessarily limited to the following:

Exterior Building Wall Joints.
Masonry Control Joints, Exterior and Interior.
Flashing and Coping Joints.
Miscellaneous Concrete Construction Joints.

SUBMITTALS:

Manufacturer's Data, Joint Sealers:

For information only, submit 2 copies of manufacturer's specifications, recommendations and installation instructions for each type of material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown. Show by transmittal that one copy of each recommendation and instruction has been distributed to the Installer.

PART 2 - PRODUCTS:

MATERIALS, GENERAL:

Colors: For exposed materials provide black color. For concealed materials, provide the natural color which has the best overall performance characteristics.

Compatibility: Before purchase of each required material, confirm its compatibility with each other material it will be exposed to in the joint system.

ELASTOMERIC SEALANTS: Any of the following:

One-Component Polysulfide Sealant (LPs-S):

Polysulfide based, one-part elastomeric sealant, complying with FS TT-S-00230, Class A, Type II (Non-sag) unless Type I recommended by manufacturer for the application shown.

Exterior Silicon Rubber Sealant, (E-SR-S):

Silicon rubber-based, one-part elastomeric sealant, complying with FS TT-S-001543, Class A; recommended by manufacturer for exterior joints.

Provide non-acid type wherever one or both joint faces are masonry, stone, concrete or other porous materials.

Provide acid-type wherever both joint faces are metal, glass, plastic, or other non-porous material.

Interior Silicon Rubber Sealant, (I-SR-S):

Silicon rubber based, one-part elastomeric sealant, complying with FS TT-S-001543, Class A; compounded specifically for mildew resistance and recommended by manufacturer for interior joints in wet areas; acid-type for non-porous joint surfaces, and non-acid type where one or both joint surfaces are porous.

CAULKING COMPOUNDS:

Synthetic Resin Caulking Compound (SR-Ck):

Oil-based caulking compound complying with FS TT-C-598, except compounded only with special synthetic resins, non-staining, non-bleeding, paintable.

JOINT FILLERS:

Bituminous and Fiber Joint Filler (BF-JF):

Provide resilient and non-extruding type premolded bituminous impregnated fiberboard units complying with ASTM D 1751, FS HH-F-341, Type I and AASHO M 213, and 3/8" thick minimum, unless otherwise shown.

MISCELLANEOUS MATERIALS:

Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer for the joint surfaces to be primed and/or sealed.

Sealant Backer Rod (S-BR): Compressible rod stock of polyethylene foam polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable non-absorptive material as recommended for compatibility with sealant by the sealant manufacturer.

PART 3 - EXECUTION:

MANUFACTURER'S INSTRUCTIONS:

Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

JOINT PREPARATION:

Clean joint surfaces immediately before installation of sealant or caulking compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant or caulking compound. Etch concrete and masonry joint surfaces as recommended by sealant manufacturer. Roughen vitreous or glazed joint surfaces as recommended by sealant manufacturer.

Prime or seal the joint surfaces wherever shown or recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

INSTALLATION:

Set joint filler units at proper depth or position in the joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.

Install sealant backer rod for liquid elastomeric sealants, except where recommended to be omitted by sealant manufacturer for the application shown.

Install bond breaker tape wherever shown and wherever required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.

Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.

Recess exposed edge joint fillers slightly behind adjoining surfaces, unless otherwise shown, so that compressed units will not protrude from the joint. Excepting bituminous and fiber joint filler used on exterior concrete walks, curbs, etc.; for such joint filler shall protrude slightly above adjoining surfaces, and without sealant.

CURE AND PROTECTION:

Cure sealants and caulking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Advise the Contractor of procedures required for the cure and protection of joint sealers during the construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at the time of Owner's acceptance.

5. METAL

SECTION 5.A. STRUCTURAL STEEL

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of structural steel (StrStl) work is shown on the drawings.

Structural steel is that work defined in the AISC "Code of Standard Practice" and as otherwise shown on the drawings.

Related Work Specified Elsewhere:

Steel Joists: Section 5A5.
Metal Decking: Section 5E0.
Miscellaneous Metal; Section 5J1

QUALITY ASSURANCE:

Codes and Standards:

Comply with the provisions of the following, except as otherwise indicated:

AISC "Code of Standard Practice for Steel Buildings and Bridges".

AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings", including the "Commentary" and Supplements thereto as issued.

AWS D1.1 "Structural Welding Code".

Qualifications for Welding Work:

Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months.

If recertification of welders is required, retesting will be the Contractor's responsibility.

Design of Members and Connections:

All details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at the site whenever possible

without causing delay in the work.

Promptly notify the Architect/Engineer whenever design of members and connections for any portion of the structure are not clearly indicated.

SUBMITTALS:

Shop Drawings: Structural Steel:

Submit shop drawings showing complete details and schedules for the fabrication and shop assembly of members.

Architect/Engineer's review of shop drawings will be for general considerations only. Compliance with requirements for materials, fabrication, and erection of structural steel is the Contractor's responsibility.

DELIVERY, STORAGE AND HANDLING:

Deliver materials to the site at such intervals to insure uninterrupted progress of the work.

Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS:

MATERIALS:

Rolled Steel Plates, Shapes, and Bars: ASTM A 36.

Cold-Formed Steel Tubing: ASTM A 500, Grade B.

Hot-Formed Steel Tubing: ASTM A 501.

Steel Pipe: ASTM A 53, Type E or S, Grade B.

Unfinished Bolts and Nuts: ASTM A 307, Grade A.

Electrodes for Welding: Comply with AWS Code.

Structural Steel Primer Paint: Fabricator's standard.

Cement Grout (PC-Grt): Portland cement and clean sand, mixed at a ratio of 1.0 part cement to 3.0 parts sand, by volume with only the minimum amount of water required for placement and hydration.

Non-Metallic Non-Shrink Grout (N-MetGrt): Pre-mixed, non-metallic, non-corrosive non-staining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C588.

Products offered by manufacturers to comply with the requirements for non-metallic, non-shrink grout include the following:

Masterflow; Master Builders
A-H Hydraulic Cement; Anti-Hydro Waterproofing Co.

FABRICATION:

General: Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the final shop drawings. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling.

Connections:

Combinations of bolts and welds in the same connections are not permitted, unless otherwise detailed.

Weld shop connections, unless otherwise shown.

Bolt field connections, except where welded connections or other connections are indicated.

Welded Constructions:

Comply with AWS Code for procedures, appearance and quality of welds, and for methods used in correcting welding work.

Holes for Other Work:

Provide holes required for securing other work to structural steel framing, and for the passage of other work through steel framing members as indicated. Provide threaded nuts welded to framing, and other specialty items as shown to receive other work.

Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

Shop Painting:

Shop paint all structural steel work, except members or portions of members to be embedded in concrete or mortar. Paint embedded steel on exposed portions and initial 2" of embedded areas only.

Do not paint contact surfaces which are to be welded.

Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

PART 3 - EXECUTION:

INSPECTION:

Erector must examine the areas and conditions under which structural steel work is to be installed, and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Erector.

ERECTION:

General: Comply with the AISC Specifications and Code of Standard Practice, and as herein specified. Maintain work in a safe and stable condition during erection.

Temporary Shoring and Bracing: Provide as required, with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of the structures as erection proceeds.

Anchor Bolts:

Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

Refer to Division 3 sections for anchor bolt installation in concrete.

Refer to Division 4 sections for anchor bolt installation in masonry.

Setting Base Plates:

Clean concrete and masonry bearing surfaces and roughen to improve bond. Clean the bottom surface of base plates.

Set loose and attached base plates for structural members on wedges, or other adjusting devices.

Tighten anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base plate prior to packing with grout.

Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

Field Assembly:

Set structural members to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Splice members only where indicated.

Do not enlarge unfair holes in members by burning or by the use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

Do not use gas cutting torches in the field for correcting fabrication errors in the structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Architect/ Engineer. Finish gas-cut sections equal to a sheared appearance when permitted.

Touch-Up Painting:

Touch-up painting of field welds, bolted connections and abraded areas of the shop paint on structural steel, as required immediately after erection and before proceeding with field painting, is included in Division 9, under painting.

SECTION 5.B.- STEEL JOISTS

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of steel joists (StJst) is shown on the drawings, including basic layout and type of joists required.

QUALITY ASSURANCE:

Provide joists fabricated in compliance with the following, and as herein specified.

AISC-SJI "Standard Specifications and Load Tables" for:

H-Series Open Web Steel Joists (H-StJst).

Qualification of Welding Work:

Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

Joists welded in place are subject to inspection and testing. Expense of removing and replacing any portion of the steel joists for testing purposes will be borne by the Owner if welds are found to be satisfactory. Remove and replace any work found to be defective and provide new acceptable work.

SUBMITTALS:

Manufacturer's Data, Steel Joists:

For information only, submit 2 copies of manufacturer's specifications and installation instructions for each type of joist and its accessories. Include manufacturer's certification that joists comply with AISC-SJI "Specification". Indicate by transmittal form that a copy of each instruction has been distributed to the Erector.

Shop Drawings, Steel Joists:

Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include the mark, number, type, location and spacing of joists and bridging.

Provide templates or location drawings for installation of anchor bolts.

DELIVERY, STORAGE AND HANDLING:

Deliver, store and handle steel joists as recommended in AISC-SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

PART 2 - PRODUCTS:

MATERIALS:

Steel: Comply with AISC-SJI "Specifications".

Steel Prime Paint: Comply with AISC-SJI "Specifications", except asphalt type paint not permitted.

FABRICATION:

General: Fabricate steel joists in accordance with AISC-SJI "Specifications".

Holes in Chord Members:

Provide holes in chord members where shown for securing other work to the steel joists; however, deduct the area of holes from the area of the chord when calculating the strength of the member.

Extended Ends:

Provide extended ends on joists where shown, complying with the manufacturer's standards and requirements of applicable AISC-SJI "Specifications" and load tables.

Ceiling Extension:

Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support the ceiling construction. Extend ends to within 1/2" of the finished wall surface unless otherwise indicated.

Bridging:

Provide horizontal or diagonal type bridging for "open web" joists, complying with AISC-SJI "Specifications".

Provide bridging anchors for ends of all bridging lines terminating at walls or beams.

End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with AISC-SJI "Specifications", unless otherwise indicated.

Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

Shop Painting:

Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.

Apply one shop coat of steel joist primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION:

INSPECTION:

Erector must examine the areas and conditions under which steel joists are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Erector.

ERECTION:

Place and secure steel joists in accordance with AISC-SJI "Specifications", final shop drawings, and as herein specified.

Anchors:

Furnish anchor bolts and other devices to be built into the concrete and masonry construction. Furnish templates for the accurate location of anchors in other work.

Placing Joists:

Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

Bridging:

Install bridging simultaneously with joist erection, before any construction loads are applied. Anchor ends of bridging lines at top and bottom chores where terminating at walls or beams.

Fastening Joists:

Field weld joists to supporting steel and base plates in accordance with

AISC-SJI "Specifications" for the type of joists used. Coordinate welding sequence and procedure with the placing of joists.

Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in AISC-SJI "Specifications" for the type of joist used.

Touch-Up Painting:

Cleaning and touch-up painting of field welds, abraded areas, and rust spots of the shop painting is included under Division 9, under painting work.

SECTION 5.C.- METAL ROOF DECKING

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of metal roof decking (RfDk) is shown on the drawings, including basic layout and type of deck units required.

QUALITY ASSURANCE:

Codes and Standards:

Comply with the provisions of the following codes and standards, except as otherwise shown or specified:

AISI "Specification for the Design of Cold-Formed Steel Structural Members".

AWS "Structural Welding Code".

SDI "Steel Roof Deck Design Manual".

Qualification of Welding Work:

Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

Decking welded in place is subject to inspection and testing. Expense of removing and replacing any portion of decking for testing purposes will be borne by the Owner if welds are found to be satisfactory. Remove work found to be defective and provide new acceptable work.

PERFORMANCE REQUIREMENTS:

Compute the properties of metal roof deck sections on the basis of the effective design width as limited by the provisions of the AISI Specifications. Provide not less than the deck section properties shown, including section modulus and moment of inertia per foot of width.

Allowable Deflection: Design and fabricate deck for a maximum deflection of 1/240 of the clear span under the total uniform dead and live load.

Uplift Loading: Install and anchor roof deck units to resist gross uplift loading of 45 lbs. per sq. ft. at eave overhang and 30 lbs. per sq. ft. for other roof areas.

SUBMITTALS:

Manufacturer's Data, Metal Roof Decking:

For information only, submit 2 copies of manufacturer's specifications and installation instructions for each product specified. Include manufacturer's certification as may be required to show compliance with these specifications. Indicate by transmittal form that a copy of each instruction has been distributed to the Installer.

Shop Drawings, Metal Roof Decking:

Submit detailed drawings showing layout of deck panels, anchorage details and every condition requiring closure panels, supplementary framing, special jointing or other accessories.

PART 2 - PRODUCTS:

MATERIALS:

Steel for Painted Finish: ASTM A 611, Grade C.

Steel for Galvanized Finish: ASTM A 446, Grade A.

Miscellaneous Steel Shapes: ASTM A 36.

Galvanizing: ASTM A 525, G90 (0.90 oz. per sq. ft.).

Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

Flexible Closure Strips for Deck: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

Paint for Non-Galvanized Deck: Deck unit manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated.

FABRICATION:

General: Form deck units in lengths to span 3 or more supports with flush, telescoped or nested 2" end laps and nesting side laps, unless otherwise indicated. Provide deck configurations complying with SDI "Basic Design Specifications", and as specified herein.

Wide-Rib Deck (WR-RfDk): Depth approximately 1-1/2"; ribs spaced approximately 6" o.c.; width of rib opening at roof surface not more than 2-1/2"; width of bottom rib surface not less than 1-3/4".

Acoustical Deck: Same configuration as wide rib deck units, unless other-

wise shown, with perforated surfaces and sound absorption material to provide the NRC rating shown.

Provide perforations on vertical webs of open flute roof deck units. Furnish sound absorbing material as specified in Section 703. Deliver to roofing installer for installation as part of his work.

Roof Sump Pans:

Fabricate from a single piece of not less than 14 gauge galvanized sheet steel of the same quality as the deck units; with level bottoms and sloping sides to direct water flow to the drain, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1-1/2" below the roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

Cant Strips:

Fabricate cant strips of not less than 20 gauge galvanized sheet steel of the same quality as the deck units. Bend cant strips to form a 45 degree cant not less than 5" wide, with top and bottom flanges not less than 2" wide, unless otherwise shown. Provide cant strips in 10' lengths where possible.

Ridge and Valley Plates:

Fabricate ridge and valley plates of galvanized sheet steel of the same quality as the deck units; each leg not less than 2-1/4" wide, bent to provide tight-fitting closure with deck units. Provide plates in 10' lengths where possible.

Metal Closure Strips:

Fabricate metal closure strips of not less than 20 gauge galvanized sheet steel of the same quality as the deck units. Form to the configuration required to provide tight-fitting closures at open ends and sides of decking.

PART 3 - EXECUTION:

INSPECTION:

Installer must examine the areas and conditions under which metal roof decking items are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

INSTALLATION:

General:

Install roof deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.

Placing Roof Deck Units:

Place roof deck units on supporting steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened. Lap ends not less than 2". Do not stretch or contract the side-lap interlocks. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

Do not use deck units for storage or working platforms until permanently secured.

Fastening Deck Units:

Permanently fasten roof deck units to steel supporting members by not less than 1/2" diameter fusion welds, or elongated welds of equal strength, not less than 12" o.c. at supports and at closer spacing where required for lateral force resistance.

Use welding washers where recommended by deck manufacturer.

Comply with AWS requirements and procedures for manual shielded metal-arc welding, the appearance and quality of welds, and the methods used in correcting welding work.

Lock side laps between adjacent deck units at intervals not exceeding 36" o.c. by tack welding, button punching, or mechanical fasteners. Weld sidelaps only on decking 18 ga. and heavier.

Cutting and Fitting:

Cut and fit roof deck units and accessories around other work projecting through or adjacent to the roof decking, as shown on the drawings. Provide neat, square and trim cuts.

Reinforcement at Openings:

Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work, unless otherwise shown.

Reinforce roof decking around openings less than 15" in any dimension by means of a flat steel sheet placed over the opening and fusion welded to the top surface of the deck. Provide steel sheet of the same quality

as the deck units, not less than 20 gauge, and at least 12" wider and longer than the opening. Provide welds at each corner and spaced not more than 12" o.c. along each side.

Roof Sump Pans:

Place roof sump pans over openings provided in the roof decking and weld to the top decking surface. Space welds not more than 12" o.c. with at least one weld at each corner. Cut opening in the bottom of the roof sump to accommodate the drain size indicated.

Cant Strips:

Weld cant strips to the top surface of the roof decking, and secure to steel framing with welds or galvanized self-tapping screws. Space fasteners or welds at 12" o.c. lap end joints not less than 3", and secure with galvanized sheet metal screws.

Ridge and Valley Plates:

Weld ridge and valley plates to the top surface of the roof decking. Lap end joints not less than 3", with laps made in the direction of water flow.

Closure Strips:

Provide metal closure strips at all open uncovered ends and edges of roof decking, and in the voids between decking and other construction. Weld into position to provide a complete decking installation.

Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

Roof Insulation Support:

Provide metal closure strips for the support of roof insulation where the rib openings in the top surface of roof decking occur adjacent to edges and openings. Weld closure strips into position.

Touch-Up Painting:

After roof decking installation, wire brush, clean and paint scarred areas, welds and rust spots on the top and bottom surfaces of decking units and supporting steel members.

Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with the manufacturer's instructions.

Touch-up shop painted surfaces with the same paint used in the shop, as recommended by the deck manufacturer.

In areas where touch-up painted surfaces are to be exposed, apply the paint to blend into the adjacent surfaces in a manner that will minimize visual discontinuity in the coatings.

Touch-Up Painting:

Cleaning and touch-up painting of field welds, abraded areas and rust spots of the shop painting or galvanizing, as required after erection and before proceeding with field painting, is included in Division 9 under Painting.

SECTION 5.D. - MISCELLANEOUS METAL

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of miscellaneous metal work is shown on the drawings and includes items fabricated from iron and steel shapes, sheets, plates, bars, strips, tubes, pipes and castings which are not a part of other metal systems in other sections of these specifications.

The types of miscellaneous metal and specialties, include, but are not limited to the following:

Hangers, Anchors, Bolts and Sleeves
Loose Steel Lintels
Weatherstripping
Metal Railings
Access Doors
Fascia Metal
Miscellaneous

GENERAL:

All items furnished shall be standard approved products, fabricated in accordance with the best shop methods, and properly and securely installed. The Contractor shall verify all measurements and spaces for items at the site for adequacy. All items, except non-ferrous metal and those otherwise specified for factory finishes, shall have shop coat of P-93 Rust Inhibitive Primer.

Shop drawings for all miscellaneous metal shall be furnished.

HANGERS, ANCHORS, BOLTS, AND SLEEVES:

Hangers, anchors, and bolts shall be provided for all parts of the work and as required. Where expansion bolts are required, each anchor bolt shall be fastened in place with two or more compounded, mandrel driven expansion anchors with corrosion resistant threaded units so as to give a holding power equal to the tensile and shearing stress of the bolts.

Provide steel plates for supporting all steel beams, etc., as detailed or as stated in Structural Steel Manufacturers Handbook.

LOOSE STEEL LINTELS:

Provide loose iron lintels of length and sizes shown on the drawings.

WEATHERSTRIPPING:

All exterior metal doors shall be weatherstripped as follows:

Sill - 360A Pemko (or approved equal).

Jambs and Head - 296AR Pemko (or approved equal).

METAL RAILINGS:

Railings: Provide steel railings where shown and detailed. Railing shall be made up of black iron pipe sections of sizes and details as shown on the drawings. All joints shall be welded and ground smooth. Anchorages shall be as detailed.

FASCIA METAL:

Fascia metal for entry roof shall be extruded aluminum, profile II as manufactured by Amarlite Anaconda without substitution. Finish shall be dark bronze Amanodic #80. Furnish fascia complete with corners, stops, caps, drips and other accessories required for a complete installation.

Install fascia metal to substrate as detailed on the drawings. Vertical sight lines shall be plumb and true and horizontal sight lines level. Fastening shall be a complete concealed system.

MISCELLANEOUS:

Items of metal not specifically mentioned in these specifications, but which are indicated on the drawings or otherwise required to complete the work under the contract, shall be considered a part of this section of the specifications.

6. DOORS, WINDOWS AND FRAMES

SECTION 6.A- STANDARD STEEL DOORS AND FRAMES

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of standard steel doors and frames is shown on drawings and schedules.

QUALITY ASSURANCE:

Provide standard steel doors and frames manufactured by a single firm specializing in production of this type of work, unless otherwise acceptable to Architect/Engineer.

Fabricate side panels and transom panels to match doors in all respects unless otherwise indicated.

Provide doors and frames complying with the Steel Door Institute "Recommended Specification, Standard Steel Doors and Frames" (SDI-100), and as herein specified.

Products: Provide standard steel doors and frames as manufactured by one of the following:

Amweld Building Products Div.
Ceco Corp.
Curries Mfg. Inc.
Fenestra.
Mesker Industries, Inc.
Republic Builders Prod. Corp.
Steelcraft Mfg. Co.

Fire-Rated Assemblies: (If any):

Where fire-resistance classification is shown or scheduled for steel doors and frames, provide fire-rated doors investigated and tested as a fire door assembly, complete with type of hardware to be used. Identify each fire door with recognized testing laboratory labels, indicating applicable fire rating of steel doors.

Construct and install assemblies to comply with NFPA Standard No. 80, and as herein specified.

Temperature Rise Rating: At stairwell enclosures, provide doors which have a Temperature Rise Rating of not more than 450 degrees F. maximum in 30 minutes of fire exposure.

SUBMITTALS:

Shop Drawings: Standard Steel Doors and Frames:

Submit shop drawings for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

DELIVERY, STORAGE AND HANDLING:

Deliver hollow metal work cartoned or crated to provide protection during transit and job storage.

Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to Architect/Engineer; otherwise, remove and replace damaged items as directed.

Store doors and frames at building site under cover. Place units on at least 4" high wood sills or on the floors in a manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide a 1/4" space between stacked doors to promote air circulation.

PART 2 - PRODUCTS:

MATERIALS:

Hot-Rolled Steel Sheets and Strip:

Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.

Cold-Rolled Steel Sheets:

Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.

Galvanized Steel Sheets:

Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, with ASTM A 525, G60 zinc coating, mill phosphatized.

Supports and Anchors:

Fabricate of not less than 18 gauge galvanized sheet steel.

Inserts, Bolts and Fasteners:

Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.

Shop-Applied Paint:

For steel surfaces, use rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

FABRICATION, GENERAL:

Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site.

Fabricate exposed faces of door and panels, including stiles and rails of nonflush units, from only cold-rolled steel.

Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and mouldings from either cold-rolled or hot-rolled steel (at fabricator's option).

Fabricate exterior doors, panels and frames from galvanized sheet steel.

Exposed Fasteners:

Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

Finish Hardware Preparation:

Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A 115 "Specifications for Door and Frame Preparation".

Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with "Recommended Locations for Builder's Hardware", published by the Door and Hardware Institute.

Shop Painting:

Clean, treat and paint exposed surfaces of fabricated hollow metal units, including galvanized surfaces.

Clean steel surfaces of mill scale, rust, oil, grease, dirt and other foreign materials before the application of shop coat of paint.

Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive field-applied paint.

STANDARD STEEL DOORS:

Provide metal doors of types and styles indicated on drawings or schedules and complying with SDI-100 for minimum materials and construction requirements.

Doors - 18 Gauge minimum.

Door Louvers:

Provide sightproof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24 gauge cold-rolled steel set into 20 gauge steel frame.

STANDARD STEEL FRAMES:

Provide metal frames of the types and styles indicated on drawings or schedules and complying with SDI-100 for minimum materials and construction requirements.

Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, as shown on the drawings. Conceal fastenings, unless otherwise indicated.

Frames - 16 Gauge minimum.

Fabricate frames of welded construction for exterior applications and knocked-down for field assembly at interior applications. All corners mitered.

Form exterior frames of hot dip galvanized steel.

Door Silencers:

Drill stops to receive 2 silencers on strike jambs of single-swing frames and 2 silencers on heads of double-swing frames.

Manufacturer's "stick-on" silencers will be acceptable in lieu of drilled type.

PART 3 - EXECUTION:

INSPECTION:

Installer must examine substrate and conditions under which steel doors and frames are to be installed and notify the Contractor in writing of any conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

INSTALLATION:

General:

Install hollow metal units and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

Placing Frames:

Comply with the provisions of SDI-105 "Recommended Erection Instructions For Steel Frames", unless otherwise indicated.

Except for frames located at in-place concrete or masonry and at drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

In masonry construction, locate 3 wall anchors per jamb at hinge and strike levels. Building-in of anchors and grouting of frames is specified in the 4A-Series sections.

At in-place concrete or masonry construction, set frames and secure to adjacent construction with machine screws and masonry anchorage devices.

Install fire-rated frames in accordance with NFPA Standard No. 80.

In metal stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In open steel stud partitions, place studs in wall anchor notches and wire tie. In closed steel stud partitions, attach studs to wall anchors with tapping screws.

Door Installation:

Fit hollow metal doors accurately in their respective frames, within clearances specified in SDI-100.

Place fire-rated doors with clearances as specified in NFPA Standard No. 80.

Finish hardware is specified in 8S-Series sections.

ADJUST AND CLEAN:

Final Adjustments:

Check and readjust operating finish hardware items in hollow metal work prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.

Prime Coat Touch-Up:

Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

SECTION 6.B.- FINISH HARDWARE

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of finish hardware is shown on the drawings on the Door Schedule. Finish hardware is defined to include all items known commercially as Builder's Hardware, as required for swing doors.

Items of hardware not included in this section and specified elsewhere:

Cabinet Hardware

GENERAL:

Installer: Assign the installation of hardware to experienced tradesmen.

Manufacturer: To the greatest extent possible, obtain each kind of hardware (latch and lock sets, hinges, closers, etc.), from only one manufacturer. Hardware numbers as follows determine the standard of quality.

Numbers Given on Hardware Schedule:

Panic Devices	-	Sargent
Hinges	-	Lawrence Brothers
Locks and Latches	-	Best 77K Series without substitution.
Closers	-	Sargent
Doors Stops	-	Quality
Thresholds	-	Pemko
Push - Pulls	-	Sargent
Cylinders	-	Best removable core, without substitution.

Other acceptable manufacturers of hardware:

Hinges: - Stanley

Closers: - Norton
Corbin
LCN

Finish: All finish to be US 10, dull bronze.

MATERIAL:

Strikes: Dull bronze with strike boxes. Strikes furnished must be of type and length to protect door frame, casing or other trim from latch bolt.

Silencers: Furnish two #33 silencers for all steel frames.

Exit Device Cross Bars: Reinforced.

QUANTITIES:

The hardware specifications are to determine quality and function only. Any openings not specifically covered shall be trimmed according to the nearest similar condition. Any function or operation of hardware in question shall be taken up direct with the Architect/Engineer prior to ordering.

SECTION 6.C. - OVERHEAD DOORS

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCIPTION OF WORK:

The extent of overhead doors (OH-Dr) is shown of the drawings.

The following types of overhead doors are specified in this section:

Steel roll-up overhead doors.

QUALITY ASSURANCE:

Provide each roll-up overhead door as a complete unit produced by one manufacturer, including frames, slats, brackets, guides, tracks, counter-balance mechanisms, hardware, operators and installation accessories, to suit the openings and head room allowable.

Manufacturer: Provide roll-up overhead doors as manufactured by one of the following:

Jim Walter Co.
Barcol Overdoor C.
Clopay Overhead Door Div.
Dalton-International, Inc.
Fimbel Door Corp.
Franz Mfg. Co.
Kinnear Corp.
Mckee Door Co.
Overhead Door Corp.
Raynor Mfg. Co.
Windsor

Inserts and Anchorages:

Furnish inserts and anchoring devices which must be set in concrete of built into mansonry for the installation of the units. Provide setting drawings, templates, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

See concrete and masonry sections of these specfications for installation of inserts and anchorage devices.

Wind Loading:

Design and reinforce sectional overhead doors to withstand a wind loading pressure with a maximum deflection of 1/120 of the opening width, as follows:

Wind Loading Pressure: 25 psf.

SUBMITTALS:

Manufacturer's Data, Roll-up Overhead Doors:

Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of door. Include manufacturer's data, operating instructions, and maintenance data. Furnish the Installer a copy of diagrams and installation instructions.

Shop Drawings; Roll-Up Overhead Doors:

Submit shop drawings for special components and installations which are not fully dimensioned or detailed in manufacturer's data.

PART 2 - PRODUCTS:

STEEL SECTIONS:

Construct door sections from galvanized structural quality carbon steel sheets complying with ASTM A 446, Grade A, or ASTM A 526, with a minimum yield strength of 33,000 psi, and a minimum G90 zinc coating complying with ASTM A 525.

Steel Sheet Thickness: 20 gauge minimum.

Exterior Section Face: Ribbed or fluted.

Slats shall be interlocking.

Reinforce bottom with a continuous channel or angle conforming to the bottom section profile.

Reinforce with continuous horizontal and diagonal reinforcing, as required by door width and the design wind loading. Provide galvanized steel bars, struts, trusses or strip steel, formed to the depth, and bolted or welded in place.

Finish door as follows:

Pretreat zinc-coating stell with a zinc phosphate conversion coating after cleaning.

Apply manufacturer's standard prime coat, applied to both door faces after forming.

TRACKS, SUPPORTS AND ACCESSORIES:

Tracks: Provide manufacturer's standard galvanized steel track system, sized for door size and weight, and designed for clearances shown. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of ball bearing roller guides, for the required door type and size. Slot vertical sections of track at 2" o.c. for door drop safety device. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

Track Reinforcement and Supports: Provide galvanized steel track reinforcement and support members. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity, and to ensure against sag, sway, and detrimental vibration during opening and closing of doors.

Support and attach tracks at opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling tracks) with continuous angle welded to track and supported by laterally-braced attachments to overhead structural members at curve and end of tracks (if required).

Weather Seals: Provide continuous, rubber o neoprene, adjustable weatherstrip gasket at the tops, rubber air baffles, and a compressible astragal on the bottoms of each roll-up door.

HARDWARE:

Provide heavy-duty, rust-resistant hardware, with galvanized or cadmium-plated or stainless steel fasteners, to suit type of door.

MANUAL OPERATORS:

Provide manual operators on the truck roll-up doors on the south wall and the north wall. Do not exceed the following for maximum required operation pull.

Manual Operation: 25 lbs. pull or lift, maximum - chain operation.

These doors with manual operators should be of such configuration that electric operators can be easily added at a later date.

ELECTRIC DOOR OPERATORS:

Provide an electric operator on the east truck roll-up door. Furnish electric door operator assembly of the size and capacity recommended and provided by the door manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, clutch, remote control stations and control devices.

Provide a hand-operated disconnect or a mechanism for automatically engaging a sprocket chain operator and releasing brake for emergency manual operation. Include an interlock device to automatically prevent the motor from operating when emergency sprocket is engaged.

Design operator so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.

Door Operator Type:

Provide trolley or drawbar type, V-belt and roller chain and sprocket primary drive, and chain and sprocket secondary drive.

Electric Motors:

Provide high starting torque, reversible, constant duty, Class A insulated electric motors with overload protection, sized to move door in either direction, from any position, at not less than 2/3' or more than 1' per second.

Coordinate wiring requirements and current characteristics of motors with electrical system of the buildings.

Provide TEFC unless otherwise indicated.

Remote Control Station:

Unless otherwise indicated, provide momentary-contact, 3-button control station with push button controls labeled "open", "close" and "stop". "Close" button must be continually pushed during closing cycle. Releasing button stops door.

Provide interior units, full-guarded type, surface-mounted, heavy-duty, with general purpose enclosures. See electrical section for specifications.

Provide exterior units, full-guarded type, standard duty, surface-mounted, weatherproof type, enclosure, key-operated. See electrical section for specifications.

PART 3 - EXECUTION:

INSPECTION:

Installer must examine the substrates and conditions under which the roll-up overhead doors are to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

INSTALLATION:

Install door, track, and operating equipment complete with necessary hardware, jamb and head mold stops, anchors, inserts, hanger and equipment supports in accordance with final shop drawings, manufacturer's instructions and as specified herein.

Fasten vertical track assembly to framing at not less than 24" o.c. Provide sway bracing, diagonal bracing, and reinforcing as required for a rigid installation of the track and door operating equipment.

Upon completion of installation, including work by other trades, lubricate, test and adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for the entire perimeter.

SECTION 6.D.- GLASS AND GLAZING

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of glass and glazing work is shown on the drawings.

The required applications of glass and glazing include, but are not necessarily limited to, the following:

Glazing exterior entrances.
Glazing exterior windows.
Glazing interior doors.
Glazing interior partitions, and miscellaneous interior glazing.

QUALITY ASSURANCE:

Safety Glass: Comply with ANSI Z97.1, with label on each piece.

Fire Resistant Glass: Tested and listed by UL for "Fire Resistance".

Noise-Reducing Glass: Labeled to show certified test for required STC rating as per ASTM E 90.

Manufacturer of Basic Glass: One of the following:

ASG Industries, Inc.
C-E Glass Division
Ford Glass Division
Libbey-Owens-Ford Company
PPG Industries, Inc.

Manufacturer of Laminated Glass: One of the following:

ASG Industries, Inc.
Dearborn Glass Company
Globe-Amerada Glass Company
Libbey-Owens-Ford Company
PPG Industries, Inc.

Manufacturer of Insulating Glass: One of the following:

Ford Glass Co.
PPG Industries, Inc.
Twin Pane Corp.
Tru-Therm

Manufacturer's Data, Glazing Materials:

For information only submit 2 copies of manufacturer's specifications, and installation instructions for each type of glazing sealant and compound, gasket and associated miscellaneous material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown. Show by transmittal that one copy of each recommendation and instruction has been distributed to the Glazier.

Samples, Glass:

Submit two, 12" square samples of each type of glass required. Architect/ Engineer review of samples will be for color, texture and pattern only.

Insulating glass samples need not be hermetically sealed, but edge construction must be included.

PART 2 - PRODUCTS:

GLASS:

Clear Plate Glass (CL-PG):

Polished plate or float glass; FS DD-G-451, Type I, Class 1, Quality g3 1/4" thick, except as otherwise indicated.

Clear Sheet Glass (Cl-SG):

Clear sheet glass; FS DD-G-451, Type II, Class 1, Quality q6 ("B" quality); double strength, except as otherwise indicated.

Tempered Glass (TG):

Either plate glass (FS DD-G-451, Type I), or sheet glass (FS DD-G-451, Type II) which has been heat-strengthened by manufacturer's standard process (after cutting to final size), to achieve a flexural strength of 4 times normal glass strength; clear (Class 1), except as otherwise indicated.

Provide 1/4" thick glass, except as otherwise indicated.

Laminated Safety Glass (LmS-G):

Two sheets of double-strength "B" Quality, clear sheet glass (FS DD-G-451, Type II, Class 1, Quality q6); permanently laminated together with 0.015" thick sheet of clear plasticized polyvinyl butyral which has been produced specifically for laminated glass.

Wire Glass:

Wire glass FS DD-G-451, Type III, Class 1, Kind A (flat), Form I (polished), UL labeled; 1/4" thick, mesh diamond welded Mississippi Polished Misco by C-E Glass Combustion Engineering Company, or approved equal.

Insulating Glass:

Two sheets of sheet glass spaced approximately 1/4" apart, filled with air at -60 degree dew point, hermetically sealed with spacers and sealant, total thickness 5/8".

All lights 5 sq. ft. and under may be 1/8" thick D.S.B. quality glass. Lights over 5 sq. ft. shall be 3/16" thick clear float B quality.

Insulating glass for Change House shall be made from one panel of clear glass and the other obscure glass. Obscure glass shall be similar to Heliolite, Mississippi Pattern (FS DD-G-451) as manufactured by C. E. Glass Combustion Engineering Company.

GLAZING SEALANTS/COMPOUNDS:

General:

Provide black exposed glazing materials, unless another color is indicated, or unless another color is selected by the Architect/Engineer from the manufacturer's standard colors. Provide hardness of materials as recommended by the manufacturer for the required application and condition of installation in each case. Provide only compounds which are known (proven) to be fully compatible with surfaces contacted.

Silicone Rubber Glazing Sealant (SR-GS):

Silicon rubber, one-part elastomeric sealant, complying with FS TT-S-001543, Class A. Provide acid-type for non-porous channel surfaces, and provide non-acid type for porous channel surfaces (where any of the channel surfaces are porous).

Acrylic-Latex Glazing Sealant (AcL-GS): (Interior Use Only):

Modified latex rubber and acrylic emulsion-polymer, compounded specifically as a glazing sealant with permanent flexibility (non-hardening), non-staining and non-bleeding.

MISCELLANEOUS GLAZING MATERIALS:

Setting Blocks: Neoprene, 70-90 durometer hardness, with proven compatibility with sealants used.

Spacers: Neoprene, 40-50 durometer hardness, with proven compatibility with sealants used.

Compressible Filler Rod (Cp-FR): Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

Cleaners, Primers and Sealers: Type recommended by sealant manufacturer.

PART 3 - EXECUTION:

STANDARD AND PERFORMANCE:

Watertight and airtight installation of each piece of glass is required. Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and doors) without failure of any kind including loss or breakage of glass, failure of sealants to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

Protect glass from edge damage at all times during handling, installation and operation of the building.

Comply with combined recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are shown or specified, and except where manufacturer's technical representatives direct otherwise.

PREPARATION FOR GLAZING:

Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.

Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.

GLAZING:

Install setting blocks of proper size at quarter points of sill rabbet. Set blocks in thin course of the heel-bead compound, if any.

Provide spacers inside and out, and of proper size and spacing, for all glass

sizes larger than 50 united inches. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

Force sealants into channel to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.

Tool exposed surfaces of glazing liquids and compounds to provide a substantial "wash" away from the glass.

Clean and trim excess glazing materials from the glass and stops or frames promptly after installation, and eliminate stains and discolorations.

CURE, PROTECTION AND CLEANING:

Protect exterior glass from breakage immediately upon installation, by attachment of crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass.

Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during the construction period, including natural causes, accidents and vandalism.

7. FINISHES

SECTION 7.A. - FINISHES ON COMMERCIAL METAL BUILDINGS

PART 1 - GENERAL

Painting specifications in section 7.B. may be waived for a commercially manufactured metal building with the engineer's (AAC) approval. All structural members of said building must be painted. Metal roofing and siding must be finished in a galvanized and/or baked on finish. Sample materials, colors and specifications shall be submitted with each bid.

SECTION 7.B.- PAINTING

PART 1 - GENERAL:

RELATED DOCUMENTS:

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

DESCRIPTION OF WORK:

The extent of painting work is shown on the drawings and schedules, and as herein specified.

The work includes painting and finishing of interior and exterior exposed items and surfaces throughout the project, except as otherwise indicated.

> Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work.

The work includes field painting of exposed bare and covered pipes and ducts (including color coding), and of hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the Mechanical and Electrical Work, except as otherwise indicated.

"Paint" as used herein means all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

Paint all exposed surfaces whether or not colors are designated in "schedules", except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the Architect/Engineer will select these from standard colors available for the materials systems specified.

PAINTING NOT INCLUDED:

The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.

Shop Priming:

Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood casework, or accessories. Touch-up painting of shop primed painting shall be done in the field as required or directed.

Pre-Finished Items:

Unless otherwise indicated, do not include painting when factory-finishing or installer finishing is specified.

Concealed Surfaces:

Unless otherwise indicated painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces and duct shafts.

Finished Metal Surfaces:

Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting, unless otherwise indicated.

Operating Parts and Labels:

Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting, unless otherwise indicated.

Do not paint over any code-required lables, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

SUBMITTALS:

Manufacturer's Data; Painting:

For information only, submit 2 copies of manufacturer's technical information including paint label analysis and application instructions for each material proposed for use. Transmit a copy of each manufacturer's instructions to the paint Applicator.

Samples; Painting:

Submit samples for Architect/Engineer's review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor. Provide a listing of the material and application for each coat of each finish sample.

Provide two samples of each color and material, with texture to simulate actual conditions. Resubmit each sample as requested until acceptable sheen, color, and texture is achieved.

On concrete masonry, provide two 4" square samples of masonry for each type of finish and color, defining filler, prime and finish coat.

DELIVERY AND STORAGE:

Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and lable, and the following information:

Name or title of material.
Fed.Spec. number, if applicable.
Manufacturer's stock number and date of manufacturer.
Manufacturer's name.
Contents by volume, for major pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.

JOB CONDITIONS:

Apply water-base paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.

Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.

Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 - PRODUCTS:

COLORS AND FINISHES:

Surface treatments and finishes are shown on the drawings and indicated in general in Paint Systems Schedule at end of this section.

Final acceptance of colors will be from comparison of approved samples with application on the job.

Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

Paint Coordination: Provide finish coats which are compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request from other trades, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime as required. Notify the Architect/Engineer in writing of any anticipated problems using specified coating systems with substrates primed by others.

MATERIAL QUALITY:

Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.

> Proprietary names used to designate colors or materials are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.

Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

PART 3 - EXECUTION:

INSPECTION:

Applicator must examine the areas and conditions under which painting work is to be applied and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Applicator.

Starting of painting work will be construed as the Applicator's acceptance of the surface and conditions within any particular area.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

SURFACE PREPARATION:

General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.

Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provided surface-applied protection prior to surface preparation and painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.

Ferrous Metals:

Clean ferrous surfaces, which are not galvanized or shop coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.

Galvanized Surfaces:

Clean free of oil and surface contaminants with an acceptable non-petroleum based solvent.

MATERIALS PREPARATION:

Mix and prepare painting materials in accordance with manufacturer's directions.

Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.

Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

APPLICATION:

General:

Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the substrate and type of material being applied.

Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, inluding edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before installation of equipment.

Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated.

Sand lightly between each succeeding enamel or varnish coat.

Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.

Scheduling Painting:

Apply the first-coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

Minimum Coating Thickness:

Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.

Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

CLEAN-UP AND PROTECTION:

Clean-Up: During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.

Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to the Architect/Engineer.

Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

PAINT SYSTEMS:

General:

The following paint systems are intended as a general guide representing finishes to be applied to various substrates encountered in the painting process. Surfaces listed are representative and not intended to be all inclusive. All surfaces shall be painted unless specifically excluded as not to be painted.

Exterior Paint Systems:

Provide the following finish coating systems for the various substrates herein specified. Numbers given are Columbia Paint Numbers, unless otherwise designed. Other manufacturers accepted are Cardinal True-Value, Moore, and Sherwin-Williams.

System E-1 - Semi-Gloss Enamel (3.5 Mils Dry Thickness):

First Coat: Enamel Undercoat, No. 00-715 or Metal Primer to suit Substrate #22 Alkyd Zinc Chromate.

Second Coat: Alkyd Enamel No. 00-705.

Third Coat: Alkyd Enamel No. 00-705.

Apply to the following surfaces:

Metal trim.
Wood trim (Unless designated to be stained).
Metal equipment.
Metal doors and frames.
Metal louvres and intakes.

System E-2 - Acrylic Emulsion (2.5 Mils Dry Thickness, excluding First Coat):

First Coat: Primer-Sealer to Suit Substrate; Block Filler for C.M.U. Units Prior to Primer Sealer - No. 43.

Second Coat: Acrylic Emulsion No. 234.

Third Coat: Acrylic Emulsion No. 234.

Apply to the following exterior surfaces:

Concrete masonry units.
Concrete.

Interior Paint Systems:

Provide the following finish coat systems for the various substrates herein specified. Numbers given are Columbia Paint Numbers, unless otherwise designated. Other manufactueres accepted are Cardinal True-Value, Moore, and Sherwin-Williams.

System I-2 - Semi-Gloss Enamel (3.5 Mills Dry Thickness):

First Coat: Metal Primer to Suit Substrate (omit where Factory Primed).
Second Coat: Synthetic Enamel No. 03-241.

Third Coat: Synthetic Enamel No. 03-241.

Apply to the following surfaces:

Wood trim.
Metal doors and frames.
Interior Millwork (where required to match existing).
Acoustic Deck, Joists and Miscellaneous Iron.
Miscellaneous metal surfaces, grilles, registers, backstop supports, etc.

8. MECHANICAL

SECTION 8.A. - VENTILATION

1. SCOPE:

The work covered by this section of the specification shall be to furnish all plant, labor, equipment, appliances and materials, to install the mechanical ventilating systems for the bulk storage building, complete, and in accordance with this section of the specifications and the applicable drawings. No departures shall be made from the drawings without prior approval of the Architect/Engineer.

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

This is a prior approval specification.

Design Parameters: Powered ventilators should change one half of the room air per hour. Ventilators will either be run manually or with thermostatic control. Thermostatic temperature cut-in should be adjustable from 70^{o}F. to 110^{o}F. Manual over-ride control should be provided. Individual ventilators should have individual controls. Ventilators shall have means of closing off vent opening to building when not in operation such as a spring loaded damper, etc.

2. MATERIALS AND EQUIPMENT SCHEDULE:

As soon as practicable and before starting to install any material or equipment, a complete list in five copies of materials and equipment to be incorporated in the work shall be submitted to the Architect/Engineer for approval. The schedule shall include catalogues, cuts, diagrams, drawings, and such other descriptive data as may be required. In the event that any items of material or equipment contained in the schedule fail to comply with the specification requirements, such items will be rejected.

3. DUCT WORK:

a. General:

All duct work shown on the drawings, specified, or required for the air handling systems shall be constructed and erected in the first class workmanlike manner. All ducts shall be straight and smooth on the inside with the joints neatly finished. Ducts shall be securely anchored to the building and shall be so installed as to be completely free from vibration under all conditions of operation.

All ducts shall be properly braced and reinforced with metal angles. The internal ends of all slip joints shall be installed in the direction of flow.

Ducts shall be fabricated of fiberglass duct material or sheet metal.

(1) Fiberglass Ducts:

The contractor shall furnish and install a 1" glass fiber board duct system equivalent to Owens Coring 475, 800 or 1400 board (density as determined by compliance with SMACNA requirements). The duct system (Type 90a) shall have Underwriters' Laboratories Incorporated Class I Air Duct Listing and shall be so labeled. The duct board shall be made of glass fibers and a flame retardant vapor barrier on the exterior surface.

All duct joints shall be stapled with flare door staples 2"o.c. and sealed with a layer of mastic and glass reinforcing tape or aluminum foil tape approved by SMACNA. A layer of this sealer and/or tape is required on all longitudinal and transverse joints.

Reinforcement of duct system shall be in accordance with duct size and 0.50" static pressure as shown in this publication.

Contractor's Option: A fiberglass duct system in lieu of sheet metal may be used. Manufacturer's installation requirements shall be strictly adhered to.

(2) Sheet Metal Ducts:

All sheet metal ducts shall be fabricated of galvanized iron or aluminum sheet metal. Gauge and reinforcement shall conform to 1/2" W.G. static chart as per SMANCA "Low Velocity Duct Construction Standards".

(3) Flexible Connections at Equipment:

Flexible connections for preventing the transmission of vibration through the ducts shall be installed between the suction and discharge openings in all air handling equipment and the ducts with which they are connected. All angles, bolts, clips, and other accessories for fastening the flexible material to the ducts, so as to make the joints airtight, shall be furnished. Flexible material shall be Duro-Dyne "Durolon", Ventfabrics "Ventlon", or approved equivalent.

d. Elbows:

All square (90^{o}) duct elbows shall have guide vanes. Guide vanes shall be shop fabricated using manufactured vane rails, and shall be quiet and free from vibration when the system is in operation. Vanes shall be hollow type made of two pieces of 24 gauge galvanized sheet metal for 18" long or wider and single blade type for under 18" length. Vanes shall be nominally 4" on centers.

Contractor's Option: Prefabricated vanes of fiberglass material equivalent to those manufactured by Duro-Dyne "QV-Quieturn" may be used in lieu of sheet metal vanes.

5. UNIT VENTILATORS:

Unit ventilators shall have direct-connected motors and multiple fan assembly. Motors shall be 60 cycle, A.C. with integral thermal protection. CFM ratings are "B" ratings as defined by the A.S.H.R.A.E.

6. TESTING, ADJUSTING AND BALANCING:

a. General:

The Mechanical Sub-Contractor shall balance all air handling systems.

(1) All balancing shall be performed under the direction of a balancing technician approved by the Architect/Engineer.

(2) This Contractor shall furnish all necessary tools, scaffolding and ladders that are required and shall provide all required instruments, take all readings and make all necessary adjustments. All instruments used for testing and balancing of systems shall have been calibrated with in a period of six months and been checked for accuracy prior to start of work.

(3) After all adjustments are made, a detailed triplicate written report shall be prepared and submitted for approval. Final acceptance of this project will not be made until a satisfactory report is received.

(4) All balance forms and procedures shall be similar to that as outlined by the Sheet Metal and Air Conditioning Contractors National Assocation (SMACNA).

b. Air Systems:

(1) Before any adjustments are made, the systems are to be checked for such items as duct leakage, damper leakage, equipment vibrations, correct damper operations, etc. All fan systems, major duct sections, registers, diffusers, etc., are to be adjusted to deliver design air quantities within plus or minus 5 percent. Individual air outlets, when one of three or more serve a space, may have a tolerance of 10 percent from the average.

c. Miscellaneous:

(1) All furnished thermal overload protection shall be observed and noted in the data sheets. If thermal overload portection is incorrect and is furnished by the Mechanical Sub-Contractor, it shall be his responsbility to see that proper overload protection is installed at the completion of the job.

(2) All balancing devices, i.e., dampers and valves, shall be clearly marked as to the final balanced position. Plus all test holes, replace access doors and belt guards.

d. Report:

(1) A report shall be provided in triplicate which shall contain a general information sheet listing instruments used, method of balancing, altitude correction, and manufacturer's grille, register and diffuser data.

(2) Provide equipment data sheets listing make, size, serial number, rating, etc., of all mechanical equipment including fans, motors, starters and drives. Operating data shall include rotational speed, inlet and outlet pressures, pressure drop across other system components, and measured motor current and voltage.

(3) Balancing data sheets shall indicate the required and actual CFM of all supply, and exhaust outlets or inlets, and shall be totaled and summarized by systems.

SECTION 8.B. - TEMPERATURE CONTROL

1. GENERAL:

Roof ventilators shall be either manually operable (ON-OFF switch) or run off of adjustable thermostatic control.

2. ELECTRICAL WORK:

All electrical wiring required for space temperature control and automatic control of air moving equipment shall be the responsibility of the Temperature Control Sub-Contractor. He shall install and wire thermostats, etc., to provide the control desired for each unit so controlled, as shown in the control diagrams on the drawings.

All wiring shall be in conduit and shall comply with all requirements of 1978 N.E.C. and Electrical section.

3. INFORMATION:

Diagrams and description of control systems with descriptive literature of all equipment being furnished, shall be furnished to the Architect/ Engineer for acceptance before starting installation.

4. GUARANTEE:

This system shall be guaranteed by the control manufacturer against all defects in material or workmanship for a period of one year from the date of acceptance. On acceptance, the manufacturer shall have representative explain and instruct the Plant's engineering staff on proper operation of the system.

SECTION 8.C. - PLUMBING

1. SCOPE:

The work covered by this section of the specifications shall be to provide all plant, labor, equipment, appliances and materials to install the plumbing systems as shown on the plans. This shall include the drain at the ramp bottom, sewer pipe and dry well. All work and materials shall be in accordance with this section of the specifications and the applicable drawings.

The general provisions of the Contract, including General Conditions and Special Provisions apply to the work specified in this section.

This is a prior approval specifications.

2. GENERAL:

The drawings indicate the general arrangement of the plumbing. Details of any proposed departures due to actual field conditions or other causes shall be submitted to the Architect/Engineer for prior approval before changing. The contractor shall carefully examine the drawings and shall be responsible for the proper fitting of materials and equipment. All utilities shall be installed below the frost line. The work shall be carefully laid out in advance and any cutting of construction shall be done only with permission of the Architect/Engineer. Cutting shall be carefully done by skilled mechanics and shall be neatly repaired. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The contractor shall carefully investigate the structural conditions affecting the work and shall arrange his work accordingly, furnishing such fittings, traps, and valves and accessories as may be required to meet such conditions. At the completion of all work, the fixtures, materials, and equipment shall be thoroughly cleaned and left in first-class condition.

3. APPROVAL OF MATERIALS AND EQUIPMENT

As soon as practicable, and within 30 days after award of the contract, and before any materials or equipment are purchased, or any estimates for partial payment are submitted, the contractor shall submit to the Architect/Engineer for approval, a complete list in five copies, of materials and equipment to be incorporated in the work. Approval of material will be based on manufacturer's published ratings. Any materials and equipment listed which are not in accordance with the specification requirements will be rejected.

4. TRENCHES:

Trenches for all underground work shall be excavated to the required depths. The bottom of the trenches shall be tamped hard and graded to secure the desired fall. Bell holes shall be excavated so that pipe will rest on solid ground for its entire lingth. No backfilling shall be done until pipe lines have been inspected and approved by the Architect/Engineer. After the pipe lines have been inspected and approved, all forms shall be removed and the excavation cleaned of all debris and trash. Backfill shall consist of the materials of the excavation or borrow of sand, gravel, or other suitable material and shall be free of trash, lumber, or debris. Backfill shall be placed in horizontal layers, not exceeding 9 inches in the thickness and shall be properly moistened. Each layer shall be compacted by hand or machine tampers to a density that will prevent excessive settlement or shinkage. Backfill shall be brought to a suitable elevation above grade to provide for anticipated settlement and shrinkage thereof. Boulders larger than 4" in diameter shall not be allowed to be in contact with pipe. Due caution shall be taken to avoid damage or dislocation of pipe.

5. SOIL, WASTE, DRAIN, VENT AND SEWER PIPING:

All soil, waste, and drain piping below slab shall be coated hub-and-spigot standard weight cast iron.

Outside sewer and drain pipe shall be cast iron soil pipe to the existing sewer.

6. INSTALLATION OF PIPE AND FITTINGS:

a. Sewer and Drain Pipe:

Laying of sewer and drain pipe shall proceed up-grade with the spigot ends of bell and spigot pipe pointing in the direction of flow.

Each pipe shall be laid true to line and grade in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow lines.

The interior of the pipe shall be cleaned of all dirt as the work progresses, and if the pipe is small, a suitable swab shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed. Trenches shall be kept free from water until the jointing material has set. When work is not in progress, all open ends of pipe and fittings shall be plugged.

b. Soil, Waste and Vent Pipes:

Horizontal soil and waste pipes shall be given a grade of 1/4" per foot where possible, but in no case less than 1/8" per foot. Vertical vent pipes may be connected into one main vent riser above vented fixtures. All stacks shall be properly supported at the base.

7. PIPE SLEEVES:

a. Pipe Sleeves:

Pipe sleeves shall be provided by this contractor and he will be responsible for their proper and permanent location. No pipe will be permitted to pass through beams or footings unless so noted on the drawings.

8. FLOOR DRAINS:

Provide the drains shown on plans. The drains shall be as indicated on the fixture list. Drains shall be manufactured by Josam, Zurn, Wade, or Smith.

SECTION 8.D. - CORRELATION BETWEEN MECHANICAL AND ELECTRICAL SUB-CONTRACTS

PART 1 - GENERAL

The building contractor (bidder) shall be responsible for the complete correlation of all mechanical and electrical sub-contractors and their respective responsibilities and work areas.

Names of sub-contractors known at bid opening shall be presented with the bid.

PART 1 GENERAL

1.01 Scope of Work

A. The requirements under Advertisement for Bid, Special Conditions and General Conditions apply to this Section.

B. Work covered by this Section shall consist of furnishing all labor, equipment, supplies, and materials, unless otherwise specified, and in performing all operations necessary for the installation of complete electrical systems within the construction schedule as required by these Specifications and as shown on the Drawings, subject to the terms and conditions of the contract. The work shall include the completion of such details of electrical work recognized as necessary for the successful operation of all electrical systems described on the Drawings or required by these Specifications.

1.02 Work Not Included

Certain labor, materials or equipment may be furnished under other contracts by utility companies or by the Owner. When such is the case, the extent, source and description of these items will be as indicated on the Drawings or described in the Specifications. Unless otherwise noted, all labor, materials and equipment for the complete installation of the electrical work shall be provided under this Section of these Specifications.

1.03 Special Requirements

A. Definitions: Instructions such as "provide the outlets . . ." shall mean the same as though the words "The Contractor shall" preceeded each such instruction. "Provide" shall mean "furnish and install". Where the words "approved" or "approval" are used, such "acceptance" action by the Engineer denotes that the work or equipment item is in conformance with the design concept of the project and, in general, complies with pertinent information given in the contract documents.

B. Drawings:

1. The Drawings indicate the general arrangement of circuits and outlets, locations of switches, panelboards, conduit routing and other work. Information shown on Drawings is schematic; however, recircuiting or relocating electrical equipment will not be permitted without specific written approval.

2. Drawings and Specifications are complementary each to the other. What is called for by one shall be as binding as if called for by both.

3. Discrepancies between different plans, or between plans and specifications, or regulations and codes governing the installation shall be brought to the attention of the Engineer, in writing.

4. The Contractor shall install the type and manufacture of equipment specified. If a manufacture is not listed for a particular product the equipment supplied shall conform to requirements as herein specified and as shown on the Drawings.

1.04 Shop Drawings

A. Shop drawings shall include manufacture's printed information with each item coded as on the Contract Documents for identification. The information submitted shall include overall dimension, weights, voltage ratings, phase, wiring diagrams, etc., and nameplate data.

B. Shop Drawings shall be submitted for, but not limited to, the following items:

1. Panel Board

2. Transformers

3. Lighting Fixtures

1.05 Standards For Materials

All materials shall conform with the current applicable industry standards, NEMA (National Electrical Manufacturer's Association); ANSI (American National Standards Institute); IPCEA (Insulated Power Cable Engineers Association); IEEE (Institute of Electrical and Electronic Engineers), National Electrical Safety Code, and shall be Underwriter's Laboratories listed unless otherwise indicated. Workmanship and neat appearance shall be as important as the electrical and mechanical efficiency. Defective and damaged materials shall be replaced or repaired, prior to final acceptance, in a manner meeting the approval of the Engineer at no additional cost to the Owner.

1.06 Codes and Regulations

The complete installation shall comply with the requirements of the National Electrical Code, National Electrical Safety Code, National Fire Code, Occupational Safety & Health Act, and all other applicable Federal, State, and Local codes. All codes and standards shall be per the latest edition with all supplements and official interpretations included. The Drawings and Specifications take precedence when they are more stringent than codes, statutes, or ordinances in effect. Applicable codes, standards, ordinances, and statutes take precedence when they are more stringent or conflict with the Drawings and Specifications.

1.07 Delivery and Storage of Materials

A. The Contractor shall investigate each space in the building through which equipment must pass to reach its final location. If necessary, the manufacturer shall be required to ship his material in sections sized to permit passing through such restricted areas in the building.

B. Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of installations such as fuses, key locks, adapters, blocking clips, and inserts until final completion of his work. These parts shall be delivered to Owner upon completion of the work.

PART 2 PRODUCTS

2.01 Equipment and Materials

A. All equipment and material installed shall be new.

B. All major equipment components shall have the manufacturer's name, address, model number and serial number permanently attached in a conspicous location.

PART 3 EXECUTION

3.01 Workmanship and Completion of Installation

A. All specialties must be installed as detailed on plans. Where details or specific installation specifications are not included herein, approved manufacturer's recommendations shall be followed.

B. All equipment and material connected with this project shall be installed complete, thoroughly checked, correctly adjusted, cleaned and left ready for proper use or operation as intended.

C. At completion, all work shall be thoroughly cleaned and all residue removed from inside surfaces. Exterior surfaces of all material and equipment shall be cleaned and delivered in a perfect unblemished condition.

3.02 Mechanical Equipment Wiring and Connection

A. Connection and control diagrams for all mechanical and control equipment shall be furnished under other Divisions and be approved by the Engineer for connection. All wiring shall conform to the National Electrical Code.

B. Safety disconnect switches for all mechanical equipment shall be furnished, installed and located in a convenient position at or adjacent to the equipment, and shall not obstruct the removal of access panels, doors or other operating parts of the mechanical equipment.

3.03 Acceptance Demonstration

Upon completion of the work, the Contractor shall demonstrate for the Owner the operation of the electrical installation, including any and all special systems provided under this contract.

3.04 Identification

A. The following items shall be equipped with nameplates:

1. All disconnect and safety switches, main distribution panel feeder overcurrent devices and spares, circuit equipment in separate enclosures.

2. Special electrical systems shall be properly identified at junction and pull boxes, terminal cabinets and equipment racks.

3. All branch circuit panelboards shall have identifying engraved plastic nameplates. Also, provide a typed directory card for each branch circuit panelboard. The card is to be placed on the interior side of the panelboard door behind a clear plastic shield. The card shall identify each circuit by number, load, and location, i.e., "AB-E-1, Area Lighting, West End".

B. No Dymo or other stick-on type of tapes will be permitted.

C. No abbreviations in labeling other than that shown on the Drawings will be permitted without special permission of the Engineer.

D. In general, equipment shall be identified as designated on the electrical drawings. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply.

E. Nameplates shall be fabricated as follows:

1. Nameplate materials shall consist of 3 ply, 1/16 inch laminated plastic with black core for lettering and white background.

2. Capital letters shall be used.

3. Nameplates shall be fastened with cadmium plated self-tapping #6 screws 1/4 inch long.

4. The minimum size of all nameplates and lettering shall be 3/4 inch high by two inches long with 1/4 inch letters.

PART 1 GENERAL

1.01 Scope Of Work

A. Furnish and install a complete conduit system.

PART 2 PRODUCTS

2.01 Aluminum Rigid Conduit

Aluminum rigid conduit shall be heavy wall with smooth interior. Each length of conduit shall be threaded and reamed on both ends and bear the name of the manufacturer and Underwriters' Laboratories label. Conduit 12 inches above grade and within the interior of structures shall be aluminum rigid conduit.

2.02 Flexible Conduit

A. Flexible conduit shall be American Brass Sealtite Type UA or equal, fabricated from continuous lengths of spirally wound galvanized steel strip, interlocked with a gray polyvinyl chloride cover extruded over the core to make the conduit liquid-tight. Flexible conduit shall be bendable to a small radius and be moisture and oil proof.

B. Liquid-tight flexible metal conduit shall be used for all motor terminations, dry type transformers, tank heaters, and equipment where vibration is present.

2.03 Conduit Supports

A. Exposed conduits shall be securely fastened in place. Hangers, supports or other fastenings shall be provided at each sweep and at the end of each straight run terminating at a box or cabinet.

B. All mounting hardware including wall support and hangers (such as steel channel) shall be made of durable materials suitable for the application involved and shall be protected after fabrication by sherardizing, galvanizing, or other approved preservative method.

C. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp backs or other approved devices with suitable bolts, expansion shields (where needed) or beam clamps and channel clamps for mounting to building structure or special brackets.

D. If adjustable trapeze hangers are used to support groups of parallel conduits, u-bolts or similar type clamps shall be used.

E. The use of perforated iron strap for supporting conduits will not be permitted.

F. The required strength of the supporting equipment and size and type of anchors shall be based on the combined weight of conduit, hanger and cables.

G. Do not suspend raceways or equipment from steam, or other piping, or ductwork, but provide independent and separate support methods. Provide toggle bolts or expansion (spider type) anchors in hollow masonry units, lead expansion bolts in solid masonry or concrete (or preferably use pre-set concrete inserts in concrete), machine screws, bolts, or welding on building structural members, and wood screws on wood construction. Note: Nails, of proper type and heads, may be used to anchor in wood construction in lieu of screws only where rigid support will be provided by their use.

2.04 Fittings and Hardware

A. Fittings, locknuts, bushings and hardware used with conduit shall be compatible with the type of conduit used. T & B or similar box connections are to be used on exposed boxes, equipment, etc., in all areas.

B. Fittings used with flexible conduit shall be of the screw-in type as manufactured by the Thomas and Betts Co., or as approved.

C. Conduit terminating in gasketed enclosures shall be terminated with meyer conduit hubs.

D. Conduit sealing compound shall be Underwriters' Laboratories approved and as manufactured by the O.Z. Gedney Company, or as approved.

PART 3 EXECUTION

3.01 Installation

A. All conduit shall be intermediate steel conduit (IMC) below grade and up to 12 inches above grade. Aluminum rigid conduit shall be used above 12 inches and within structure interiors. All rigid metallic conduit shall be cut square, threaded, reamed smooth and drawn up tight. Use proper compound on all threaded joints. Crouse-Hinds type STL lubricant, or approved other. Field bends shall be made with an approved bender or hickey, or hub-type conduit fittings. Number of bends per run shall conform to National Electrical Code limitations for rigid conduit.

B. Conduits shall be continuous from outlet to outlet, from outlets to cabinets, pull or junction boxes and shall be secured to all boxes with locknuts and bushings in such manner that each system shall be continuous throughout.

C. Conduit terminals at cabinets and boxes shall be rigidly secured with locknuts and bushings as required by the National Electrical Code and local electrical code.

D. Conduits shall be securely supported by steel channel (Unistrut), or as approved, or hangers, or supporting assemblies as indicated on the plans. Clip type fasteners will not be allowed. All connectors shall be made up tight.

E. Use flexible conduit at terminations of motor, limit switches, tank heaters, transformers, etc., where vibration is present, two foot minimum length.

F. All exposed conduit shall be so arranged as to avoid interference with equipment and its removal or maintenance.

G. All conduits on exposed work shall be run at right angles to and parallel with the surrounding wall and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall run perfectly straight and true.

H. Structural steel or structural prestressed concrete members shall not be drilled or pierced under any circumstances without the Owner's specific approval. Exposed conduits intersecting vertical planes and ceilings, with right angle turns shall be installed with pull boxes, fittings or symmetrical bends. Offsets shall be avoided where possible, but where necessary, shall be made with an approved hickey or conduit bending machine. Conduit which has been crushed or deformed in any way shall not be installed.

I. The location and arrangement of all major conduit runs shall be cleared with the Owner prior to installation.

J. No conduit smaller than 3/4 inch electrical trade size shall be used unless specifically noted. Pull boxes shall be provided as required or directed.

K. No wire shall be pulled into the conduit system until the conduit system is complete in all details; in the case of concealed work, until all rough plastering or masonry has been completed; and in the case of exposed work, until the conduit system has been completed in every detail.

L. The ends of all conduits shall be tightly plugged to exclude dust and moisture while the buildings are under construction. Spare conduits shall be left plugged at both ends.

M. The Contractor shall follow manufacturer's recommendations regarding handling, installation, termination, bending, and coupling.

WIRE AND CABLES

PART 1 GENERAL

1.01 Scope of Work

Provide a complete system of conductors in raceway systems as shown on the Drawings and hereinafter specified. All wire shall be routed through an approved raceway regardless of voltage application.

1.02 Quality Assurance

All conductors shall be in accordance with the applicable sections of Underwriters' Laboratories and IPCEA standards.

PART 2 PRODUCTS

2.01 Materials

A. Wire and Cable:

1. All wire shall be copper. Conductors shown on plans are thusly sized.

2. All ground conductors shall be copper.

3. Minimum wire size for branch circuits shall be #12 AWG; however, smaller size wire may be used for control circuits where specified on the Drawings.

4. All conductors #8 AWG and larger shall be stranded.

5. Copper conductors shall be annealed, 98 percent conductivity soft drawn copper.

B. Insulation:

1. All conductor insulation types shall be rated for wet and dry locations and shall be approved by the National Electrical Code for the particular application. All wire and cable shall have the following insulation classes:

   a. All feeders, type XHHW, and branch circuits type THHN/THWN.

   b. All insulation shall be rated for operation at 600 volts.

PART 3 EXECUTION

3.01 Installation

A. Wire sizing noted on Drawings shall extend for the entire length of a circuit unless noted otherwise. Install wire in raceways in strict conformance with the manufacturer's recommendations. Use an approved wire pulling lubricant. Strip insulation so as to avoid nicking of wire.

B. Wire Connection and Devices;

1. All terminating fittings, connectors, etc., shall be a type suitable for the specific cable furnished. All fittings shall be made up tight. Make up all terminations in strict conformance with manufacturer's recommendations using special washers, nuts, etc., as required.

2. Connect No. 8 and larger wire to panels and apparatus with properly sized, solderless, or compression lugs or connectors.

3. Connect No. 10 and smaller wire by using steel splice caps with proper crimping tool and insulating nylon cap screw over the completed connection. Twist type connectors will not be permitted.

4. At least eight inch loops or ends shall be left at each outlet box for the installation of fixtures or devices.

C. Lugs and fittings shall be tightened per manufacturer's recommendations.

GROUNDING SYSTEM

PART 1 GENERAL

1.01 Scope of Work

Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as hereinafter specified and shown on the Drawings.

PART 2 PRODUCTS

2.01 Materials

All materials shall be new and free from defects such as rust or corrosion. Materials subject to depreciation in the presence of moisture such as Cadweld powder shall be stored until use in a clean dry place assigned for such storage. The Cadweld process equipment shall be stored in a clean dry place and shall be kept free of dirt and other foreign materials. Cadwelding equipment shall be inspected regularly by the Contractor to insure proper device operation. Each mold shall be used to make not more than 50 Cadweld connections.

2.02 Equipment Grounding Conductors

Unless otherwise noted all equipment and structure grounding conductors shall be annealed 98 percent conductivity soft drawn copper.

PART 3 EXECUTION

3.01 Power Ground Grid

A. All service equipment, conduit systems, supports, cabinets, equipment, and motor control centers, and trenchduct shall be bonded to the power ground grid. This work shall be accomplished in accordance with the applicable sections of the latest issue of the National Electrical Code.

3.02 Equipment Grounding

A. Provide all bonding jumpers, wire, grounding bushings, clamps, etc., as required for complete grounding. Route ground conductors to provide the shortest and most direct path to the ground electrode system. All ground connections shall have clean contact surfaces.

B. Lighting transformer neutrals shall be grounded to the main service grounding system.

C. All connections made by the exothermic process shall be "hammer tested" to insure that a good bond has been made.

D. A grounding terminal pad shall be provided in all panelboards, switchboards, cabinets, motor control centers, and other electrical equipment is to be connected to the main service entrance with a copper conductor.

E. Welding machines used in construction shall be grounded directly to the work piece. The use of building or equipment steel or conduits of any kind as a common ground point is not allowed under any conditions. The Contractor shall be responsible for any wiring, instrumentation, computer or other electrical pieces of equipment damaged by not using the welder grounding method described above.

DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.01 Scope of Work

Furnish and install dry type transformers as shown on the Drawings and hereinafter specified.

PART 2 PRODUCTS

2.01 Materials

A. Provide dry type, air cooled transformers which shall transform the supply voltage as called for on the Drawings and Specifications. Transformers shall have two 2-1/2 percent taps FCBN and FCAN on the primary side as a minimum for units 3 KVA and larger.

B. Transformers shall be constructed with grain oriented magnetic circuit, such as Hipersil, to minimize no load losses and exciting current.

C. The core and coil to be rigidly held to withstand short circuit stresses resulting from 25 times normal load current for a period of two seconds.

D. Core and coil treatment to be by immersion in an insulating resin system of the class equal to the temperature rise and to be cured at temperatures to result in complete encapsulation of core and coil.

2.02 Sound Levels

Sound levels must fall within ASA-NEMA Standards levels accordings to KVA size.

2.03 Manufacturer's Standards

Transformers must be listed by Underwriters' Laboratories, Inc., and built in accordance with the latest revision of ASA C89, NEMA ST-1 and ANSI standard for general purposes specialty transformers.

2.04 Insulation

Class transformers shall be insulated with Class B, 80^{0} C rise, insulation system through 30 KVA. Transformers larger than 30 KVA shall be class H, 115^{0} C above 40^{0} C ambient.

2.05 Acceptable Manufacturer

Units shall be General Electric, Hevi-duty, Tierney, Sorgel, or as approved.

PART 3 EXECUTION

3.01 Installation

A. Transformers shall be mounted in such a manner as to obtain a quiet operation. Provide flexible conduit connections and set units on vibration pads.

B. Any transformer causing objectionable sound will be required to be replaced.

C. Set taps under load conditions for correct voltage.

BRANCH CIRCUIT PANELBOARDS

PART 1 GENERAL

1.01 Scope of Work

Furnish and install all panelboards as hereinafter specified and as shown on the Drawings.

1.02 Standards

A. Panelboards shall be in accordance with the Underwriters' Laboratories, Inc. "Standards for Panelboards" and "Standard for Cabinets and Boxes" shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards and the National Electrical Code.

B. Panels shall be as manufactured by Square D.

1.03 Submittals

Submit shop drawings showing details of housing, trim, ratings, arrangement and type of breakers. Submittal data shall be complete with outline dimensions, descriptive literature, and complete description of the frame size, trip setting, class, and interrupting rating of all breakers and switch and fuse units and panel bus bracing. Available spaces shall be identified.

PART 2 PRODUCTS

2.01 Construction

A. Interiors:

1. All interiors shall be completely factory assembled with buses and breakers or switches.

2. Interiors shall be so designed that circuit breakers can be replaced without disturbing adjacent units and without removing the main bus connectors and shall be so designed that circuits may be changed without machining, drilling or tapping.

3. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. Branch circuits shall be numbered by the manufacturer.

4. All spaces shall be fully equipped with bus and mounting straps for the maximum device that can be fitted into them.

5. Panel shall have a typewritten directory card mounted under a transparent protective cover, set in a metal frame on the inside of the cabinet door. The directory shall contain the following information:

   a. Panel designation.

   b. Point from which it is fed.

   c. Individual branch circuit identification number (as shown on panel schedules), load served, and location i.e., "RPZ-UP, Power, Room 102".

6. All panelboards shall have a grounding terminal pad for the equipment grounding system. Grounding terminal pad shall be separate from the insulated neutral bus.

7. The entire assembly shall be thoroughly cleaned inside and out and all surfaces phosphatized and primed with a conductive zinc coating. Inaccessible surfaces shall be phosphatized and primed before welding. All welds shall be ground and sanded to remove the scale formed during welding. All internal welds, seams, joints, and splices shall be wire brushed. Next, all surfaces shall be coated with a primer of zinc chromate, iron oxide or as approved. All surfaces shall then be finish-coated with an epoxy resin enamel to an average thickness of six mils. Color shall be the manufacturer's standard gray. The finish paint shall be of a type to which field applied paint will adhere.

8. Panelboards shall have general purpose enclosures and shall be surface mounted except where shown otherwise.

9. The nameplate to be furnished by the manufacturer, affixed to the dead front of the panelboard shall contain the following data:

   a. Manufacturer's name and address
   b. Manufacturer's type designation
   c. Manufacturer's identifation reference
   d. Rated voltage
   e. Rated continous current
   f. Rated frequency

   In addition to the above manufacturer's nameplate, furnish a laminated plastic nameplate in accordance with "Identification", page EE/4.

10. Panelboards shall be complete with compression (bolt) type wire connectors.

B. Buses:

1. Buses in the panelboard shall be of copper sized in accordance with Underwriters' Laboratories standards. Connections shall be bolted and laminations interleaved to secure maximum contact areas. All buses and stub connections shall be made of such a size as to limit the temperature rise to 50^{0} C when carrying full load current capacity. Full size insulated neutral bars shall be included. Phase bussing shall be full height without reduction. Cross connectors shall be copper.

2. Neutral bussing shall have a suitable lug for each outgoing feeder requiring a neutral connection.

C. Boxes:

1. Boxes shall be made from code gauge steel. Surface mounted boxes shall be painted to match the trim. Boxes shall be of sufficient size to provide a minimum gutter space of four inches on all sides.

2. At least four interior mounting studs shall be provided.

D. Trim:

The trims shall be fabricated from code gauge sheet steel.

2.02 Circuit Breaker Type Panelboards

A. Circuit breaker type panelboards shall be equipped with circuit breakers with frame size and trip settings as shown on the Drawings.

B. Circuit breakers shall be molded case, bolt-in type.

C. Breakers shall be thermal magnetic type employing quick-make and quick-break mechanisms for manual operation as well as automatic operation. Automatic tripping shall be indicated by the breaker handle assuming a distinctive position from manual "on" and "off". All multipole breakers shall have a common trip. Tie handles will not be permitted.

D. Circuit breakers used in 120/240 volt panelboards shall have an interrupting capacity of not less than 10,000 amperes, RMS symmetrical at 240 volts.

PART 3 EXECUTION

3.01 Installation

A. Install box, trim, and interior rigid and plumb. Center interior with door opening.

B. Install panelboards in accordance with the instructions of the manufacturer and as shown on the Drawings complete with all required electrical connections.

C. Install panelboards with the top of the trim six feet from the finished floor, unless noted otherwise on the Drawings.

D. Field check all panelboard loading and reconnect circuits as required to provide balanced phase and line loads.

E. Cables installed in wiring gutters of panelboards shall be neatly bundled, routed, and supported. Minimum bending radii as recommended by the wire and cable manufacturer shall not be reduced.

F. Check and verify connections on all panel bus connections in accordance with the manufacturer's recommendations.

LIGHTING

PART 1 GENERAL

1.01 Scope of Work

A. Furnish and install lighting fixtures as shown on the Drawings and as hereinafter specified.

B. Lighting fixtures shall be installed as shown on the Contract Drawings. Details not shown in the Contract Drawings or mentioned in the Contract Specifications shall be obtained from the Owner's Engineer before installation is permitted to proceed.

C. The lighting installation shall be designed and the luminaire selected on the basis of minimum maintained light level, rather than the initial value.

D. The lighting installation shall be designed and installed so as to achieve five foot candles of light, IES recommended minimum foot-candle for Warehouse inactive storage.

PART 2 PRODUCTS

2.01 Material

A. High intensity discharge high pressure sodium lamp fixtures shall be as called for in the Contract Drawings and Specifications.

B. Ballasts shall be included with high intensity discharge high pressure sodium lamp fixtures and shall be of one lamp or more type, as specified, of the highest efficiency design and equipped with integral capacitors to correct the overall power factor of each lighting unit to at least 90 percent.

C. The ballast transformers shall be designed to operate on the primary voltage specified as 120 volts.

D. Externally mounted ballasts shall be of the low noise type.

E. Lamps shall be supplied by the Owner.

PART 3 EXECUTION

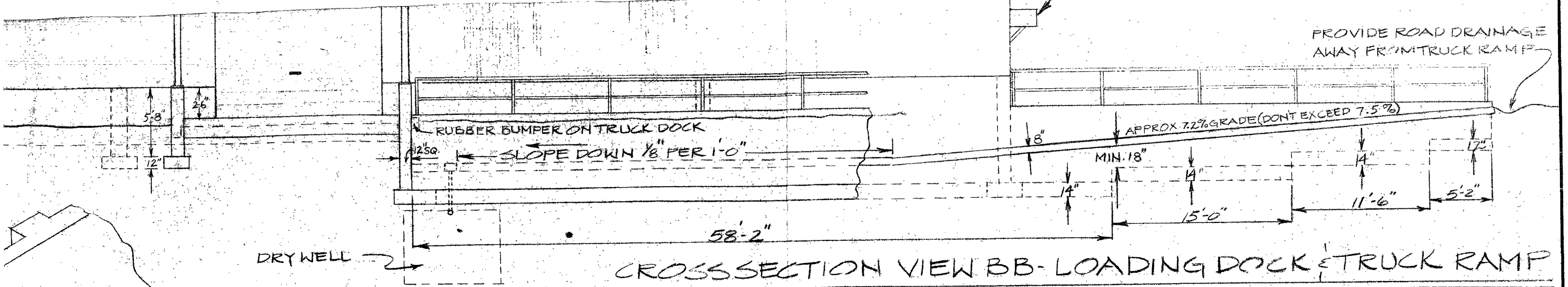
3.01 Installation

A. Fixtures shall be mounted in such a manner as to meet all OSHA and NEC code requirements.

B. All fixtures shall be installed with safety chains.

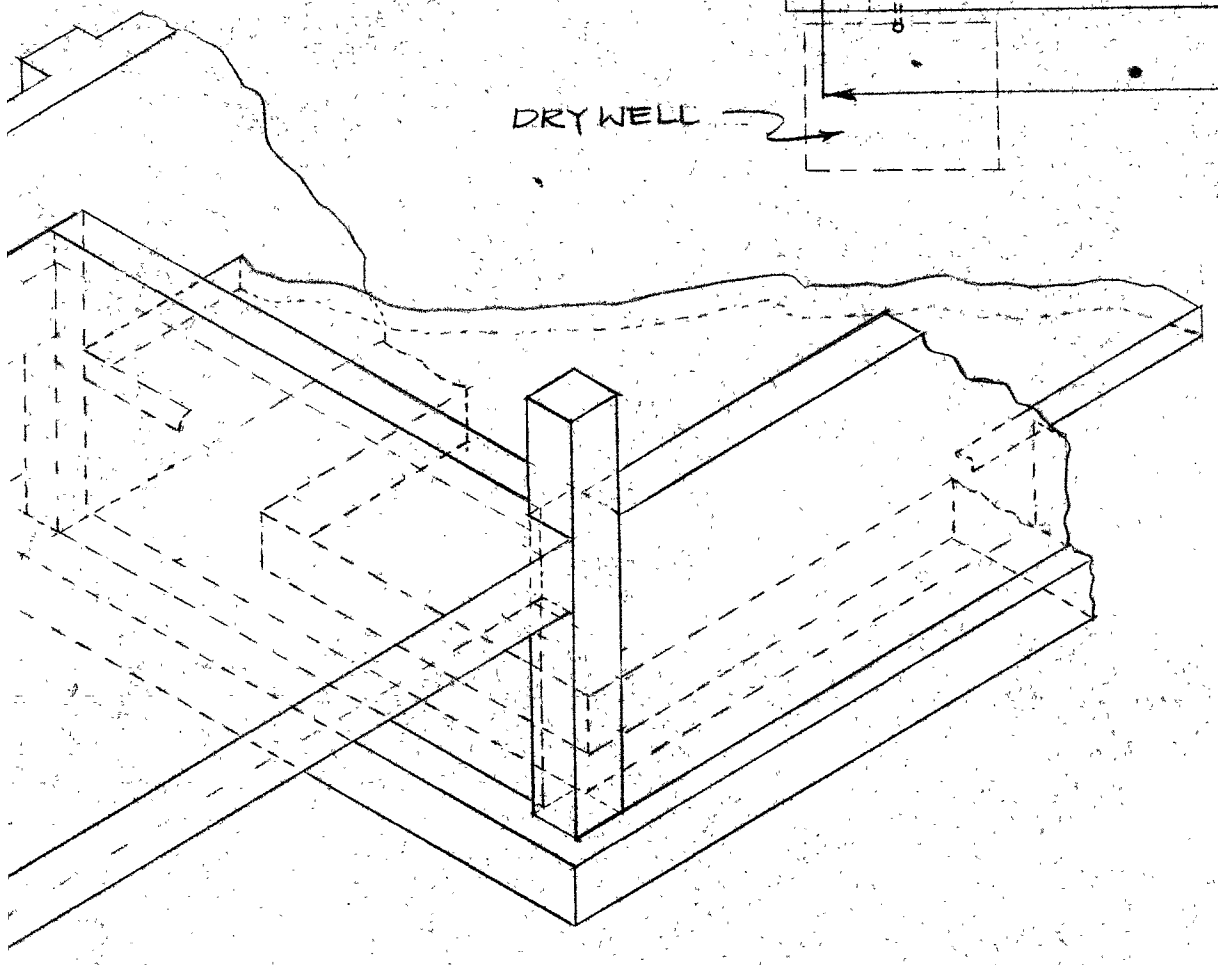
E-829

E-830



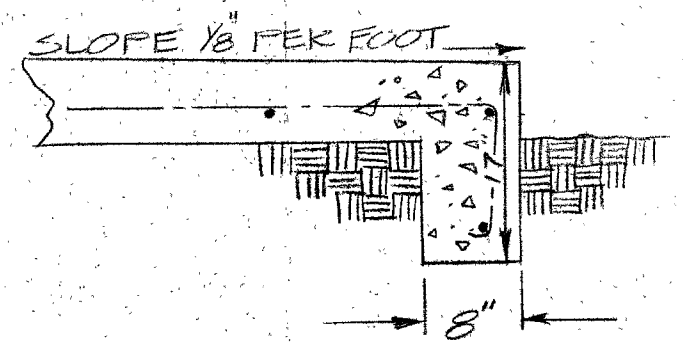
CROSSSECTION VIEW BB - LOADING DOCK & TRUCK RAMP

1/8" = 1'-0"



ISOMETRIC VIEW OF FTGS. @ LOADING DOCK & TRUCK RAMP

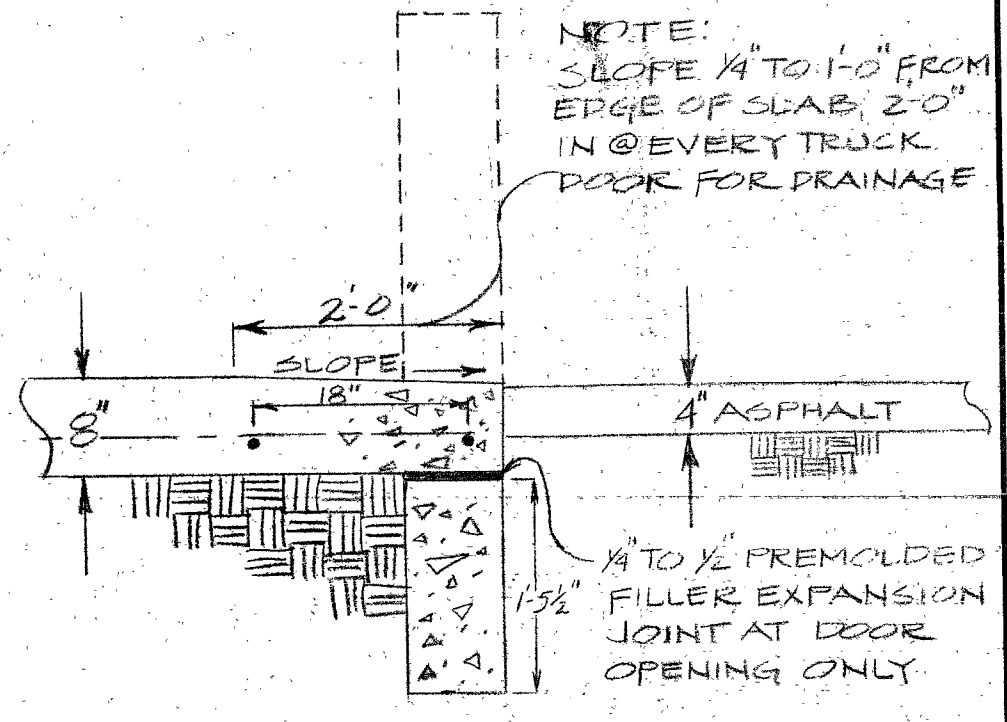
1/4" = 1'-0"



CROSSSECTION VIEW DD

3/4" = 1'-0"

NOTE:
SLOPE 1/4" TO 1'-0" FROM EDGE OF SLAB, 2'-0" IN @ EVERY TRUCK DOOR FOR DRAINAGE



CROSSSECTION VIEW CC
CONC. SLAB @ TRUCK DOORS TYP.

3/4" = 1'-0"

ITEM	NO. REQ.	DESCRIPTION	MAT'L	NEXT HIGHER ASSEMBLY DWG	MARK	DETAILED ON DWG. NO.	* REMARKS

BILL OF MATERIAL

☒ DRAWN BY EHSTREICH
☒ ENGINEER
☒ ENG. SUP'R.
☒ SAFETY
☐ ENVIRONMENTAL

THE ANACONDA COMPANY
ALUMINUM DIVISION
COLUMBIA FALLS, MONTANA

367-P

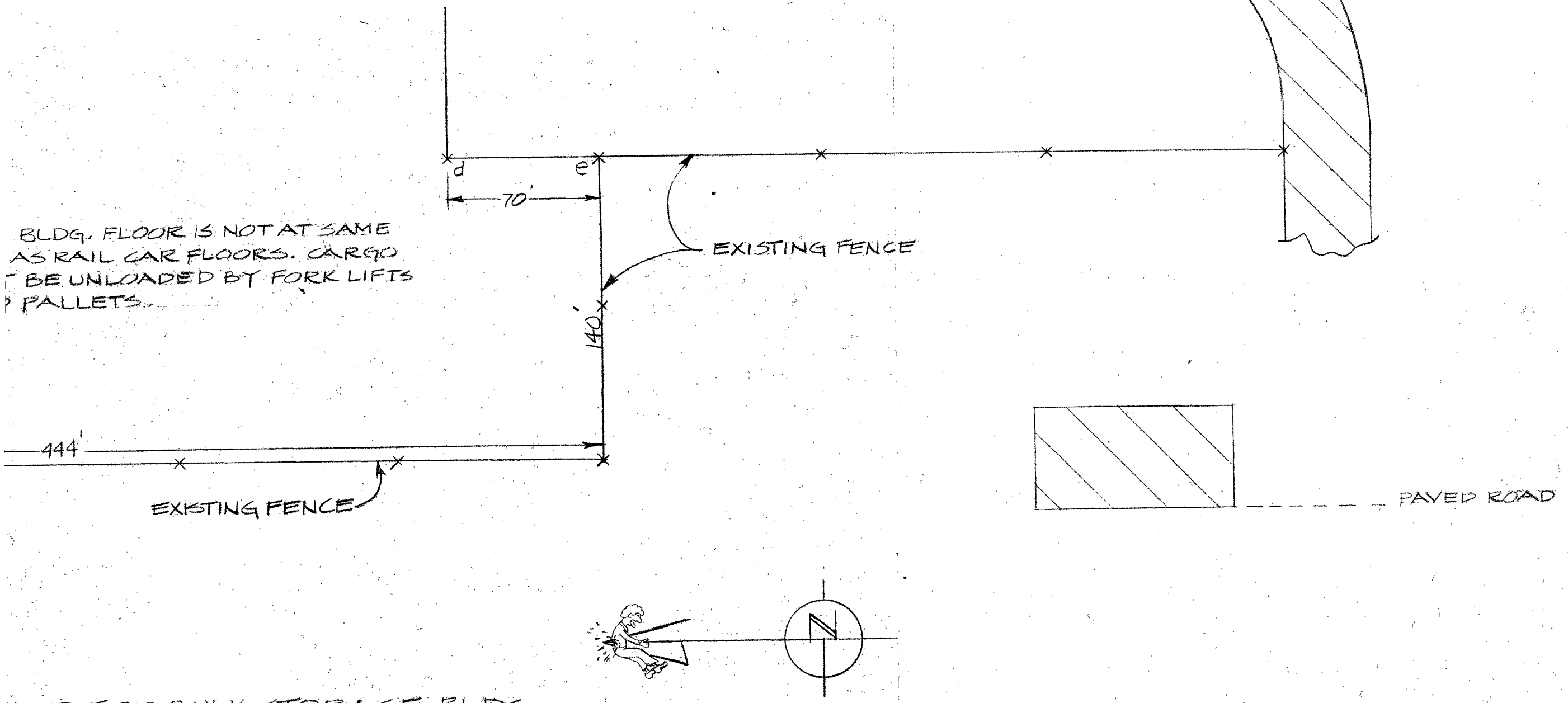
BULK STORAGE BUILDING
PLAN VIEW, CONCRETE & FOOTING DETAILS

DATE OF ISSUE 9-28-81
SCALE: AS NOTED

E-830

REVISION NO.

ARCF00004412



BLDG. FLOOR IS NOT AT SAME AS RAIL CAR FLOORS. CARGO BE UNLOADED BY FORK LIFTS PALLETS.

MAP FOR BULK STORAGE BLDG.

1" = 50'

☒ DRAWN BY	EHSTRECH
☒ ENGINEER	
☒ ENG. SUP'R.	Philip D Faure
☒ SAFETY	
☐ ENVIRONMENTAL	

THE ANACONDA COMPANY
ALUMINUM DIVISION
COLUMBIA FALLS, MONTANA
367-P

ITEM	NO. REQ.	DESCRIPTION	MAT'L	NEXT HIGHER ASSEMBLY DWG	MARK	DETAILED ON DWG. NO.	REMARKS

BILL OF MATERIAL

BULK STORAGE BUILDING
BUILDING & STORAGE AREA

DATE OF ISSUE 8-25-81
SCALE: AS NOTED

E-829

REVISION NO.